



FRIDAY, MARCH 9, 1900.

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Contributions.

Cast-Iron Wheels for Locomotive Trucks.

Western Maryland R.R. Co.)  
Union Bridge, Md., Feb. 21, 1900.)  
To the Editor of the Railroad Gazette:

In reading over the discussion by the Master Mechanics in Convention at Old Point in June last, I notice that cast-iron wheels are not considered safe for engine truck wheels.

I have been in charge of the Motive Power and Rolling Stock of the Western Maryland Railroad for more than twenty-three years, and I believe my experience with cast iron wheels for locomotive trucks will be interesting, at least to some of your readers.

We have a hilly road, with several ten-degree, reverse curves, and 11 miles of grade from Thurmont to Blue Ridge Summit that average 95 ft. to the mile, part of it being 106 ft. On this mountain grade we have a horseshoe curve and a curve of 10° 30'. We have 61 locomotives weighing from 60,000 to 132,000 lbs., and in the twenty-three years we have had but one accident from cast iron wheels under engine trucks. This occurred with an 18x24 in. cylinder Mogul engine. As the truck wheel struck a frog, from some unknown cause, about nine inches of the flange was broken off. This being the only engine we have had to leave the track, there cannot be any other accident that could be charged to cast iron wheels. We use under all of our engines the swing motion truck, and have been using it from the time I entered this company's service. The swing motion truck may be the secret of our success with cast iron wheels under engine trucks.

At present we are using the Lobdell wheel. We have used the Baltimore Car Wheel, Scovill, Whitney, Jackson & Woodin' and others with perfect safety. One of our Mogul locomotives with cast iron truck wheels ran a passenger train for three summers without any accident. It is but seldom we remove a truck wheel on account of worn flange; they generally wear through the chill or shell out in spots.

With this record I fail to see how this road can buy any other wheel that would give a result equal to this: One engine truck wheel broken in twenty-three years.

DAVID HOLTZ, M. of M.

An Economical Freight Train Speed.

To the Editor of the Railroad Gazette:

In a communication to the Railroad Gazette (Feb. 2) entitled "An Economical Freight Train Speed," Professor W. J. Raymond presents a very ingenious argument and reaches some interesting conclusions.

An analysis of the article presents the following characteristics: First, an assumption that for all speeds above ten miles an hour the locomotive may be expected to develop its maximum power. Second, that the resistance of a train is near its minimum limit when the speed is ten miles an hour. Third, that the rate of speed should never be lower than that which will allow the locomotive to develop its maximum power.

Justification for the first two of these assumptions is based upon an exhibit of formulae, while that of the third is deemed to be self-evident. Arguing from these assumptions, it is concluded that for maximum efficiency, the speed up the limiting grade should be ten miles an hour, the rate on other portions of the line being greater than this and always such as will permit the engine to develop its maximum power. Mr. Raymond further shows that with a speed of

ten miles an hour up a ruling grade of one per cent., a speed of 26.2 miles an hour will be the most economical on the level, and a speed of 39.9 miles on a down grade of one-half of one per cent.

A serious defect in the argument would seem to arise in the assumed or deduced rate of speed up the ruling grade. On this question Mr. Raymond refers to Wellington's formula for train resistance and points out that the resistance as given by this formula is minimum for a speed of six miles an hour; also that an increase of speed to ten miles an hour increases the resistance by only seven per cent. Hence, he justifies assuming a minimum speed of ten miles an hour because it is a rate of speed which is attended by a resistance which is but little above the minimum and is the minimum speed which allows the locomotive to work at its maximum power.

Now, while it is true that an increase of speed from six to ten miles an hour is attended by a slight increase of resistance on a level, the conditions do not hold on an up-grade where the resistance is of two sorts: First, that due to friction, and, secondly, that due to the grade. The power required to overcome the latter varies directly with the speed, and when this increase of resistance is taken into account, it cannot be assumed that an increase of speed from six to ten miles an hour is accompanied by a slight increase in train resistance. The steeper the grade, the wider will be the divergence between the assumption and the fact, and since this assumption is fundamental in the argument which Professor Raymond presents, there would seem to be some question as to the validity of the conclusion which he has reached.

X.

The M W 100 Per Cent. Rail Joint.

Chicago, February 19, 1900.

To the Editor of the Railroad Gazette:

In your issue of January 19 a new rail joint is shown which is interesting to the writer, chiefly because a relation is established between the bending moment of the rail and the bending moment of the joint. The patentee does not state whether the bending moments are inch-pounds or foot-pounds, although it is presumed the latter is intended, and that they are for a concentrated load.

I do not see how the cutting away of the "Inbent" portion of the splice ends relieves the ties of the stresses transmitted through the splice from rail to rail; or, if the "Inbent" portions were left in the splices, how that would tend to transmit the stresses to the ties; for, in both cases, the stresses transmitted through the splice from rail to rail is transmitted through the central part of the splice which projects down between the ties.

I am also a patentee of a rail joint, but my conclusions differ from the figures of Mr. Thomson. Below are the data for four splices, the nearest to correspond to those of Mr. Thomson. In calculating this table, an excess of 10 per cent. was allowed in the joint above the strength of the rail.

Size of rail.	Length of joint.	Net wt. of joint.	Rail, safe load in ft. lbs.	Splice.			
				Safe load.	I	A	C S
100	14 1/4	58.66	58,333	63,700	66.88	15.64	4.2 12,000
90	13 1/4	45.90	45,865	49,695	49.96	12.57	3.9 12,000
80	12 1/4	36.46	39,400	41,283	37.66	11.47	3.6 12,000
70	11 1/4	32.89	32,333	37,802	31.38	10.32	3.3 12,000

It will be observed that there is a striking difference between the bending moment and the weight, as compared with Mr. Thomson's results. The weight of his joint for a 100-lb. rail is given at 85.4 lbs., and the bending moment at 46,600 lbs., therefore the bending moment per pound of joint is 545 lbs. My figures for a similar joint are over 1,000 lbs. per foot of joint. A similar comparison for all the four splices given shows like differences. The formula to determine

$$\text{the same load is the same, } M = S \frac{I}{C}.$$

No more has to be done on this joint (after the section is rolled) than is required in the common fish-plate; that is, cutting to length and punching. I am glad to see this matter taken up by engineers—to whom it properly belongs—and that at least one person has been working along the same lines as myself. The stress per unit area cuts no figure, so long as they are alike in both rail and joint.

R. HINCHCLIFFE.

Mr. Thomson comments as follows on the above:

Altoona, Pa., March 1, 1900.

To the Editor of the Railroad Gazette:

I can hardly feel justified in taking sharp issue with Mr. Hinchcliffe; for, while we are working along the same lines and are looking at two structures designed to meet the same end, the conditions under which the two structures have been placed are evidently different. When he gets a higher safe load for his 100-lb. rail, and a higher safe load for his 100-lb. splice, that means nothing more than that he took a distance between his supports less than the 18 in. which I gave. In fact, the length of his splice is only 14 1/4 in., and his distance between supports would of necessity be somewhat less than

that. I have not been made familiar with the style of bars to which he is referring, but, in the light of recent practice, they seem very short. How short a grip we can take on the ends of two rails to make a successful and safe splicing has perhaps not been accurately determined. In 1890, or earlier, Mr. Bannister, Chief Engineer of the London, Brighton & South Coast Railway, placed on his 84-lb. bull-head rail a pair of splices that were of 100 per cent. strength, the length of which was only 18 in. His strong form of rail and wide spacing of ties enabled him to do this, and I believe that splice is standard on that road to-day. We, however, with our flat-base rail and our narrow spacing of ties, have different conditions to meet.

Mr. Hinchcliffe seems to have misunderstood what was said about stresses passing to the ties. I was comparing the splicing structure as published January 19 with my earlier pattern, which had the end portions of the depending flanges thrown up to horizontal position, to form wide lugs resting on the ties. I stated that this latter structure was in the nature of a bridge, and that the stresses delivered at the center could be transmitted through the splices to the ties, while in case of the other structure (the one shown Jan. 19) which took no bearing on the ties, the stresses could only pass to the ties as they passed through the rails themselves. This will, no doubt, make the matter clearer, and at the same time indicate that the two forms are radically different in principle.

When Mr. Hinchcliffe refers to our reaching different conclusions or results, I think he only means that we are furnishing figures that are based on different conditions, and that these figures are apt to be misleading until they are explained.

M. W. THOMSON.

Signaling As It Is and As It Might Be.

THE PRESENT.

BY A. H. RUDD.

(Continued from page 98.)

On a number of trunk lines the foreman stage is passed, and Signal Engineers in fact, if not in title, are in charge. Two systems are in vogue. Either each division has its own organization, or there is one general head for the entire road. Let us consider the first condition in two phases: under a close and under a liberal Superintendent.

In the first instance everything is sacrificed to saving in expense. This perhaps does not appear particularly in installation, although new work must be put in at the lowest figure, or all future work is vetoed. But in maintenance every nerve is strained to keep the figures down. Maintainers must be called upon to assist in construction work, neglecting their proper duties; and consequently inspections are kept at a minimum; and if the number of failures is not too pronounced, the condition is considered satisfactory. Not the Engineer, but the Superintendent is in fact the head of the department. A controlled manual system recently came under the observation of the writer where locks were tied up or failed to drop in place, towermen had keys to release their instruments, and track relays were habitually plugged because the Superintendent insisted that "we must get our trains over the road," while at the same time he failed to provide the requisite inspection force, and then pointed with pride to the record his signal expert was making in economy of maintenance. He really thinks his department is about perfect.

"Eternal vigilance is the price of safety," but this poor "signal sharp" never commands the price; and some day, when one of those trains "gets over the road"—and all over it, at that—the cause of the occurrence will be a seven days' wonder. Thoroughly competent inspectors cannot be obtained at the wages paid on the road in question. They are either men of steady habits and little knowledge, who cannot cover their sections in the allotted time and do their work thoroughly; or else skilled men who cannot be depended upon, perhaps on account of their bad habits, and who neglect their duties from lack of interest. The conditions here noted obtain also under a general organization in some instances, and for the same causes.

Under a liberal official, however, this plan of organization, while not always providing a bed of roses, is for the Signal Engineer an almost ideal one, in some respects. His force is usually a small one, he is perfectly acquainted with its personnel, and with all the details of the work in his limited territory; and he can give his personal attention to inspection and installation to a very large degree. With men enough to do the work without waste, but in the best possible manner, with the knowledge that his maintainers are attentive to their duties and can be trusted, he has confidence amounting almost to certainty that all will be well. Consequently his worries are few but—the salary is small. If he just fits the place, well and good. If, however, he is fitted for a much larger field, he becomes surfeited with the wealth of detail and the delicacies of the work, has unpleasant symptoms and at last falls into a rut, and usually a narrow one.



Even under the most favorable conditions there is one great defect in this system, viz.: lack of standards. Take as a fair illustration a road having five or six divisions. Each division head has his own ideas. There are four or five types of interlocking machines prominently on the market, and it is a fair supposition that each division will have not less than two of them. More probably each division has to carry three styles of machine parts in stock, and the same condition exists regarding nearly all material; while each man has a different method of installation. It is a good thing for the signal companies who first furnish the material, but a mighty poor one for the road barred from the market. Each division has its storehouse or houses. Several might be combined at a central point if the lines converge or intersect, and the cost of storekeeping and stock accounts decreased. By a general organization of the proper sort, the salaries of its higher officials could be paid, with a handsome surplus remaining, by making these changes alone.

In the general organization, as it usually exists to-day, the head of the department reports either to the Chief Engineer or the General Manager or Superintendent. He establishes standards, orders material (passing upon the division requisitions as well as upon all new work, for which latter he prepares plans), and when the work is installed, it is turned over to the divisions for maintenance and manipulation. Here his work ends. If the plants are improperly maintained he cannot be held responsible, as the maintenance force reports to the Division Superintendent, who is not and, as previously shown, cannot be expected to be an expert. Is there not a flaw here? The same course is pursued in other departments, but the best sentiment is opposed to it, and the tendency is all against divided responsibility, with its resultant evils.

Resorting again to analogy—after locomotives are acquired by the motive power department, are they run by men selected solely by the Division Superintendents? Are they repaired in shops under his charge? Who is responsible for the inspection of rolling stock, of air brakes, and other elaborate machinery? Is responsibility divided between the Division Superintendent and the building and engineering departments?

How can a Signal Engineer know whether his standards require modification and how keep abreast of the times, no matter how good his judgment may be, if, after installing them, he never receives reports of their performances? In some cases he is favored with this data, but unless he knows the conditions at the time of report he cannot get a clear idea of their merits or defects or properly study failures. He must keep in touch with the maintenance force, and know that the work is properly cared for. What advance would there have been in locomotive construction if no data concerning the performance of new devices were accessible to the designer?

Present practice is so varied that a brief summary of the different methods of organization will be of interest. The list may not be absolutely correct as to titles, but these are immaterial in the comparisons desired to be made.

#### Chicago & North Western.

Signal Engineer reporting to Chief Engineer. All mechanical and electrical forces report to Signal Engineer.

#### C. C. & St. L.

Signal Engineer reporting to Chief Engineer, making all plans and periodical inspections, and deciding all signal questions. Division Foremen in charge of division work.

#### C. N. O. & T. P.

Superintendent of Telegraph. Two general foremen of signals (one for each district), under whom are all the mechanical and electrical forces.

#### Erie Railroad.

Signal Engineer reporting to Assistant Chief Engineer; establishes standards and has general charge of all signal work. The actual maintenance and construction forces report to the different Division Engineers.

#### Illinois Central; Michigan Central; Chicago & N. W.

Signal Engineer, reporting to Chief Engineer. Supervisor of Electric Signals in charge of all electrical forces; Supervisor of Mechanical Signals in charge of all mechanical forces, except that on Illinois Central some lampmen report to Road Department.

#### Long Island.

Signal Engineer. Under him, (a) Signal Foreman, in charge of all mechanical forces and lampmen, and (b) Electrician, in charge of all electrical forces.

#### Lake Shore & Michigan Southern.

Signal Engineer, reporting to Principal Assistant Engineer; establishes standards and makes plans. All maintenance and construction forces report to two Master Carpenters, who in turn report to the Principal Assistant Engineer. Levermen report to Division Superintendents.

#### Lehigh Valley.

Signal Engineer, reporting to Engineer Maintenance of Way. Under him (a) Supervisor of Electric Signals, in charge of all electrical forces, and (b) Supervisor of Mechanical Signals, in charge of all mechanical forces. The Signal Engineer has absolute charge.

#### New York Central & H. R.

Assistant Superintendents of Signals, reporting to Division Superintendents. Electrical and Mechanical Repairmen, and Foremen, Levermen and Lampmen reporting to the same.

#### New York, N. H. & H. Eastern District.

Supervisor of Interlocking, in charge of Division Foremen and all mechanical forces. Electrician, in charge of Division Foremen and all electrical forces. Both heads report to the General Superintendent.

#### New York, N. H. & H. Western District.

Two Signal Engineers, reporting to their Division Superintendents. Under them are all signal forces. Lampmen on one division report to Signal Engineer; on the other, to Section Foremen. Levermen, Station Agents, etc., according to location of signals. A third division has a Foreman of Interlocking and an Electrician, both reporting to the Division Superintendent.

#### Philadelphia & Reading.

General Signal Foreman. Chief Signal Inspectors.

Division Signal Foremen, to whom report all maintenance and construction forces and Lampmen.

Pennsylvania.  
Signal Engineer, reporting to Engineer of Maintenance of Way. He establishes standards, makes plans and orders material. Supervisors of Signals report to Division Assistant Engineers and have full charge of construction and maintenance forces, carrying out plans of Signal Engineer.

#### Comparative Table of Wages.

Wages of Signal Forces prevailing under present practice:

	Per month.	Per day.
Signal engineers .....	\$30 to \$150	\$2.66 to \$5.00
Electrical supervisors .....	70 " 90	2.33 " 3.00
Interlocking supervisors .....	55 " 75	1.83 " 2.50
Division foreman, interlocking .....	55 " 75	1.83 " 2.50
Gang foremen, interlocking .....	50 " 75	1.65 " 2.50
Gang fitters, interlocking .....	50 " 68	1.66 " 2.27
Gang helpers, interlocking .....	30 " 40	1.00 " 1.33
Electrical repairmen .....	40 " 75	1.33 " 2.50
Electrical battery men .....	40 " 55	1.33 " 1.83
Lampmen .....	30 " 40	1.00 " 1.33
Tower operators .....	25 " 65	.83 " 2.17

Average wages as shown by Interstate Commerce Commission report:

	Per day.
Locomotive engineers .....	\$4.47
Conductors .....	3.67
Other trainmen .....	2.65
Station agents .....	2.42
Section foremen .....	2.22
Machinists .....	2.91
Station help .....	2.18
Carpenters .....	2.77
Other shopmen .....	2.34
Trackmen .....	1.39
Telegraph operators, dispatchers .....	2.76
Switch, flag and watchmen .....	2.17

The above comparisons are made as nearly as possible between classes of labor requiring similar capacities (except in the first item) and carrying somewhere nearly like responsibilities. They speak for themselves.

The responsibility for a proper organization and the selection of the right man at its head, rests entirely with the general officers. When this responsibility has been met, and the department established, the entire work should come under this official head, who should be held to a strict accountability for its correct installation and perfect maintenance. This leads to the consideration of the Signal Engineer and his forces to-day.

[TO BE CONTINUED.]

#### Slid-flat Car Wheels.

At the January meeting of the Northwest Railway Club, Mr. F. B. Farmer, of the Westinghouse Air Brake Company, discussed the causes of slid-flat car wheels. He first stated that it seems to be the general experience that the greatest number of wheels are skidded in winter, when the ground is not covered with snow; that the dust and the frost make a combination most favorable for skidding. As to other causes for slid wheels, he said in part:

Some time ago, while investigating the question of slid wheels, my attention was called to a machine that was being used at that time in the Soo shops. They grind cast wheels and mate and remount them. Noticing that a pair of wheels in the grinder had flat spots, and that the wheels were out of true, I asked the man to see if other cases were similar to this, showing that the large part of the wheel was just passing under the brake shoe, when the part having the flat spot would have been in contact with the rail. He followed it up for some time, and found that this is almost invariably true. On a road that had considerable trouble from cast wheels flattening, the matter was given some attention, and a device was got up for quickly testing this feature. They found a few cases where the wheels were bored out of center, traced them, and found a boring mill was responsible for the poor condition; so that I think the two instances cited are sample illustrations of causes of wheels sliding.

It has been frequently remarked that when a wheel or a pair of wheels flattens, the next time they catch it will be in the same spot. I think this is more often due to such a cause as just mentioned rather than to the flat spot made in the first instance.

It may be of interest to hear of a test that was made on a western road some three years ago. Owing to the large number of flat wheels in a train of loaded cars, a test was made to determine about what pressure was necessary to slide wheels, and the distance necessary to produce a given length of flat spot. A loaded box car weighing 69,000 lbs. at the rails, was charged to 100 lbs. pressure, the brake was applied with full force standing, and the car was pulled for one-half mile. One pair of wheels turned almost the whole distance, two pairs slid intermittently, causing what is termed a "chain" flat, a succession of small flat spots, not serious enough to justify removal. One pair slid the entire distance, and had a 2½-in. flat spot. Another test was made by applying the brake heavily, and pulling the car 100 ft. on what might be termed an ordinary rail, without sand. Then they examined the spot in contact with the rail and found scarcely any abrasion. The test was repeated on an undamaged spot, using sand the whole distance, and they found, upon examination, a 1-in. flat spot. So this shows how seriously sand may effect the flattening, and it indicates as well the small probability of wheels starting to revolve when sand is used after once locking. Of course, the great weight on the rail, with the car loaded, aided materially in causing this long flat spot, resulting from 100 ft. of sliding.

On the ore-carrying roads much trouble has been experienced from wheels sliding, due to several causes, the most important being that the empties are hauled one way, and the direction is generally an ascending grade. The grade and the empty cars enable the stop to be made with a very light application of the brake. In order to insure a release of applied brakes, the train-pipe pressure throughout the whole length of the train

should be raised quickly and considerably. Where the reduction is small, the difference between the main reservoir pressure and the train line at the time of the release is correspondingly less than where the application is heavier. For that reason, holding the brake valve in the full-release position for a short length of time would give a sluggish flow toward the rear end and a lesser raise in pressure. If, to correct that, as far as possible, the brake valve is left in full release for a longer period, the brakes up at the head end are liable to be overcharged, and later on, through the temporary absence of any supply, the brakes may stick.

To overcome this the men have been instructed to insure, before attempting to release, a reduction of at least 10 to 15 lbs. On one road they even went so far as to say that before attempting to release, a full service application of 20 lbs. reduction should be made, and at the end of the season, whether from that or more attention being paid to other details, they had a better showing on the flat wheel question than previously. That same difficulty of brakes sticking from a light application has been met with often on passenger trains, particularly when the engineman has applied the brake a little to steady the train around curves. It does not mean that the application made for the purpose of stopping the train at a given point must be any different than otherwise, but before the release is attempted enough should be added to that to insure the desired result.

In discussing this question with some of the air brake men in this part of the country it was demonstrated that one of the principal difficulties attendant on the investigation of slid-flat wheels arose from the insufficient and unreliable information they had to start it with. The Northern Pacific had this matter up several years ago, and improved on the slid-flat wheel report used for several years by the Chicago, Milwaukee & St. Paul road. It first called for certain information from the inspector, telling him of the kind of test to make, and was a very valuable report, inasmuch as it also educated the men to guard against these troubles and thereby prevent wheel sliding. This was the report to be made out by the inspector. It was found, however, that you could not get from him a sufficiently accurate report as to the condition of the triple valve. The triple valve could not be repaired, when defective in the packing ring or slide valve, by the men, and had to be sent to the repair point where there was a competent man with the necessary tools. So, a form was got up to accompany the triple valve. At present the valve is invariably removed from the car in the case of flat wheels. Another one is put on, and, with the report which accompanies it, the removed valve is sent to one of the repair points, where they have plants for making an accurate test and men who are skilled in doing this work. The lower half of the report which accompanies the valve is left blank, to be filled in by the man making the test, and when it is finished, and the results are recorded, he forwards this report to the road foreman of the district. The man that removed the valve from the car makes out his report and forwards it to the road foreman, attaching the air brake defect card turned in by the conductor of the train bringing the car in. This same inspector immediately advises the roundhouse foreman of the train bringing in flat wheels. This foreman has a form calling for the condition of the pump governor, the pump, brake valve, and the brake parts on the engine that might have any bearing on the case. The roundhouse foreman also ascertains from the engineman who handled that train whether there was any burst hose, break-in-tuos, or other cases calling for emergency application, that could have had any bearing on the subject. This information is forwarded to the road foreman, who originally spent a good deal of time hunting up this information, or endeavoring to hunt it up, but never getting it accurate or complete. Now, he has to devote no time to that; these reports all come in to him giving all the information that can possibly be gleaned on the subject, and from this he is able to determine, if it can be told, the cause of the flat wheels. The brake leverage of the car is also given on one of the reports. All of the different brake diagrams are printed on the back, and it is easy for the carman, without making any sketch, to show the location of the slid wheels with relation to the hand brake of the car.

In a number of cases it was found that the air brake was in perfect condition, and that the flat wheels were on the hand-brake end of the car. Those familiar with the Master Car Builders' type of brake rigging for freight cars will appreciate that, generally speaking, the hand-brake power is greater on the truck next to the hand brake than on the other; therefore, when these reports finally reach the General Air Brake Inspector, by tabulating them he is able to ascertain the number of cases where the air brake was in good shape and the flat wheels that were on the end of the car nearest the hand brake, which indicates that the cause of the sliding was very probably the hand brake. Then, I believe, a graphic report is made out, which enables one to see at a glance the number of slid-flat wheels, and the comparative record of that month and the corresponding month, or any month, of the same or the previous year.

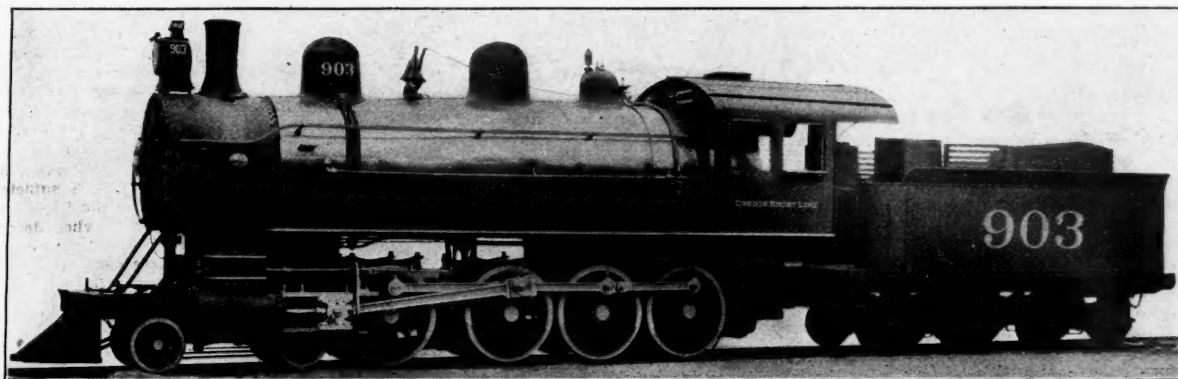
I might add that the ore roads have very generally adopted what is termed the two-pressure system, which consists of carrying merely a lower train-pipe pressure with their empties and higher than the standard with the loads, which makes both safer, not only from the standpoint of wheel sliding but also from the danger to trainmen resulting from a burst hose or a break-in-two, when a man is trying to pass over the tops of the cars. The combination of those two, lower pressure and heavier applications, has resulted in a great betterment. They find, too—those who have watched the matter—that there are certain particular places where the brakes have stuck most, and that these places are where light reductions have been made. The Duluth, Missabe & Northern and the Duluth & Iron Range, the Lake Superior and Ishpeming and the Butte, Anaconda & Pacific are carrying 55 lbs. with their empties and 80 lbs. with their loads. Eighty pounds is used merely



because they have found it sufficient with the loads, but more can be carried, if required. If the cars were heavier, or they increased the speed, they would be justified in a corresponding raise in the pressure. As regards the effect of the ore dust, I am unable to say whether it would make a more slippery rail or not, but I have attributed a certain amount of sild wheels to the before-mentioned cause, and to the fact that ore cars are generally braked at a greater per cent. of their light weight than cars in other service. The great discrepancy in the light weight and the loaded weight renders that desirable.

**Twelve-Wheel Freight Locomotive for the Oregon Short Line Railroad.**

The Cooke Locomotive & Machine Company has recently completed some heavy twelve-wheel freight locomotives for the Oregon Short Line, one of which is shown in the accompanying engraving. The total weight in working order is 200,000 lbs., and the weight on the driving wheels is 171,000 lbs. The cylinders are 21 by 30 in. and the drivers are 55 in. in diameter, with cast steel centers. The boiler is of the extended wagon-top type, designed to carry 200 lbs. steam pressure. It is 74 in. in diameter at the front and has 351 charcoal iron tubes, 2 in. in diameter and 14 ft. long. The firebox heating surface is 219 sq. ft., the tube heating surface 2,457 sq. ft. and the total heating surface is 2,676 sq. ft.; the grate area is 33 sq. ft. The tender, loaded, weighs 101,000 lbs., and



Twelve-Wheel Freight Locomotive—Oregon Short Line.

has a capacity for 4,500 gallons of water and 10 tons of coal; it is mounted on Fox pressed steel trucks.

The other principal dimensions and the special equipment are as follows:

Gage face, diameter.....	4 ft. 8½ in.
Kind of fuel to be used.....	Soft coal
Wheel base, total, of engine.....	26 ft. 2¼ in.
" " driving.....	15 ft. 8 in.
" " total (engine and tender).....	53 ft. 10½ in.
Length over all, engine.....	39 ft. 1 in.
" " total, engine and tender.....	63 ft. 7 in.
Height, center of boiler above rails.....	9 ft. 0 in.
of stack above rails.....	15 ft. 5 in.
Truck wheel diameter.....	30 in.
Journals, driving axle, size.....	9 x 12 in.
" truck.....	5½ x 10 in.
Main crank pin, size.....	6½ x 6 in.
Piston rod, diameter.....	4 in.
Main rod, length center to center.....	3 ft. 11½ in.
Steam ports, length.....	18 in.
" width.....	1½ in.
Exhaust ports, length.....	18 in.
" width.....	¾ in.
Bridge, width.....	¾ in.
Valves, kind of..... Richardson Bal. Allen Port	
" greatest travel.....	5½ in.
" outside lap.....	1½ in.
" inside lap or clearance.....	lap ¾ in.
" lead in full gear.....	¾ in.
Boiler, working steam pressure.....	200 lbs.
material in barrel.....	Steel
thickness of material in barrel.....	¾ in.
Seams, kind of horizontal.....	Butt joints
" circumferential.....	Lap joints
Thickness of tube sheets.....	¾ in.
" crown sheet.....	¾ in.
Crown sheet stayed with..... Crown bars	
Dome, diameter.....	31½ in.
Firebox, length.....	10 ft. 3 in.
" width.....	3 ft. 2½ in.
" depth front.....	¾ in.
" back.....	7½ in.
" material.....	Steel
" thickness of sheets, sides and back.....	¾ in.
" brick arch?.....	Yes
" water space, width; Front 4 in., sides 4 in., back 4 in.	
Grate, kind of..... Rocking finger bar	
Smokebox, diameter.....	73 in.
" length.....	60 in.
Exhaust nozzle..... Single	
" Permanent	
" diameter.....	4½ in.
" distance of tip above center of boiler.....	2½ in.
Netting..... Wire	
size of mesh or perforation.....	2½ x 2½ per in.
Stack.....	
" least diameter.....	16 in.
" greatest diameter.....	18½ in.
" height above smokebox.....	3 ft. 4 in.
Tender.....	
Type..... Swivel trucks	
Kind of material in tank..... Steel	
Thickness of tank sheets.....	¾ in.
Type of under-frame..... 10-in. steel channels	
Type of truck..... Fox pressed steel	
Truck with..... Right bolster	
Type of truck spring..... Double elliptic	
Diameter of truck axle.....	2 in.
Diameter and length of axle journals.....	5 x 9 in.
Distance between centers of journals.....	6 ft. 4 in.
Diameter of wheel fit on axle.....	6½ in.
Diameter of center of axle.....	5½ in.
Type of truck bolster..... Fox pressed steel	
Type of truck transom..... Fox pressed steel	
Length of tender frame over bumpers.....	22 ft. 3 in.
Length of tank.....	30 ft. 1½ in.
Width of tank.....	9 ft. 9½ in.
Height of tank, not including collar.....	56 in.
Height of tank over collar.....	66½ in.
Type of back drawhead..... Buckeye coupler	

With or without water scoop.....Without

### Special Equipment.

Special Equipment:	
Wheel centers.....	American Steel Casting Co.
Tires.....	Midvale Steel Co.
Axles.....	Taylor Iron
Sight-feed lubricators.....	Nathan Mfg. Co.
Bell ringer.....	Little Giant
Front and back couplers.....	Back-Buckeye
Safety valve.....	Coale
Sanding devices.....	H. L. Leach
Injector.....	Nathan Mfg. Co.
Driver brake equipment.....	New York Air Brake Co.
Tender brake equipment.....	New York Air Brake Co.
Tender brake beam.....	Kewanee
Stop gears.....	Spring Co.
Engine truck springs.....	Spring Co.
Driving springs.....	A. French Spring Co.
Tender springs.....	A. French Spring Co.
Piston rod packing.....	C. C. Jerome
Valve.....	C. C. Jerome
Lagging.....	Franklin Mfg. Co.

### The Compilation of Ton-Mile Statistics.

We published last week, page 138, a paper by Mr. Quereau on the "Compilation of Ton-Mile Statistics." What follows is an abstract of the discussion of that paper, which took place on its presentation at the last meeting of the Western Railway Club.

Mr. G. R. Henderson, Chicago & Northwestern: Undoubtedly it is almost worthless to compare statistics of different railroads, or even different divisions of the same system on account of the differences in conditions, and the idea has largely gone into disuse. A great deal of attention is paid to

see how it can be done for the work train engine. You can get a figure, I admit that; the question is, how reliable it is.

Mr. G. W. Rhodes, Burlington & Missouri River: Mr. Quereau says that it is as important to have the passenger tonnage as the freight tonnage. There has been a great deal of talk lately about the cost of handling fast freight trains. I think that if both statements are kept by tonnage, it will help very materially in explaining to railroad managers what high speed trains mean. For instance, freight trains ought to be hauled for about 4 lbs. of coal per loaded car-mile, but passenger trains will go all the way from 12 lbs. per car per mile up to 20 or 24 lbs. per car per mile. At one time on the Burlington road the question came up as to why we were using so much coal in our freight service, and it was shown very clearly that one of the reasons was that the speed of the freight trains was accelerating all the time and the tonnage was diminishing all the time. It was also shown that if we accelerated our freight trains to the speed of the passenger trains, we must expect the tonnage of the freight trains to be more nearly like the tonnage of the passenger trains, and the consumption of fuel consequently more nearly like the consumption of fuel on these passenger trains. Now, let me show what that would mean on a road like the Burlington.

In July, 1891, the pounds of coal consumed per pas-

senger car-mile on the Chicago, Burlington & Quincy was 12.16, in July, 1892, it was 12.08; in freight service in July, 1891, it was 5.12 pounds; in July, 1892, it was 5.55. At that time it was shown by the mechanical department of the Chicago, Burlington & Quincy that some of the freight trains were following as sections of passenger trains, and that in some cases they left points at Galesburg a head of passenger trains and got into Chicago ahead of passenger trains. We explained if

that was the way the management was going to operate its freight trains, that instead of being able to haul our cars, with 5 and 6 lbs. of coal per loaded car-mile, we should be using 12 lbs. We showed that it would amount in the year to \$100,000. In other words, there would be \$100,000 increase in fuel consumption by a diminution of tonnage and increase in speed, so that I would strongly advise the railroads to keep the passenger car tonnage separate from their freight car tonnage, and then as freight speeds increase, they always know approximately what it is going to be, compared with the passenger service. There is another interesting feature that Mr. Quereau calls my attention to. It has often puzzled me to know why the wages of engineers should fluctuate so much per one hundred ton-miles. The passenger mileage on a road is pretty constant, but the freight at certain seasons is very much in excess of the passenger mileage and the freight engineers' wages being higher than the passenger men's wages, when this freight increases and the figures are all thrown into one, it naturally raises the wages of your engineers. If you had the passenger separate from the freight, you would find that it would be constant, the passenger would keep its uniform rate, and the freight would keep its uniform rate.

Mr. F. A. Delano, Chicago, Burlington & Quincy: Mr. Quereau and Mr. Henderson both say that it is useless to get up statistics or compare figures made by one road with another, but such comparisons will be made until the end of time, and roads similarly situated ought to be able to compare their methods of operating. I cannot see why the cost of handling passengers on passenger trains on the Northwestern main line, and the Rock Island or the Chicago, Burlington & Quincy main line, going through a very similar country, cannot be compared. I do not see why the cost of operating on the Eastern trunk lines similarly situated and located cannot be compared, and one reason why comparisons in the past have been so unsatisfactory is that there has not been uniformity in the method of accounting and tabulating statistics. There has been a distinct improvement in recent years, I think, in statistics of railroads in keeping the branch line mileage and tonnage separate from the main line, and there are other things of that kind. A few statistics very carefully kept, for instance, absolutely accurate statistics over one portion of a road, would be of very much more value than the loosely kept statistics of a whole road where all kinds of figures are jumbled up together to draw your conclusions from. The Railroad Gazette in an editorial which I read a number of weeks or months ago, spoke of the difference in the methods of computing train mileage in use by the different

Mr. J. F. Deems, Chicago, Burlington & Quincy: Mr. Quereau says it is customary to credit switch engines with an arbitrary mileage, etc., and then he refers to work train service. I am unable to see how it will be profitable to get anything like a proper ton-mile basis for work train engines with the character of work they are engaged in. It would be possible with the switch engines by simply taking the arbitrary mileage that is adopted, but I cannot



roads. There are some roads that figure construction mileage, official mileage, double-header mileage, differently from other roads, and of course, when figures are tabulated that way you cannot compare one road with another.

I am inclined to differ from Mr. Quereau in his opinion about including the weight of the engine with the train. I can see that something is to be said on that side of the argument, but the general manager of a road wants to know what the engine is doing. For instance, suppose the policy has been to get very much heavier engines, he wants to see how much more tonnage those engines are hauling behind the tender than the lighter engines did before. There are many cases and many kinds of service where the lighter engines should do the work more economically, and you are likely to get the wrong impression by including the tonnage of the engines in your statistics. We want to know what that engine is pulling, not what the steam is doing in the cylinder. That is another and separate question.

Now, as to how tonnage should be determined. Is this tonnage system in order to produce statistics? If so, we want to have the tonnage of the train when loaded or empty, the actual tonnage hauled. We do not want to add an arbitrary figure such as Mr. Quereau suggests. I understand the Pennsylvania Lines West of Pittsburgh have the practice of adding seven tons for every empty car. If they add seven tons for an empty car, they ought to add three-fourths of that to a car three-fourths loaded, and so on. Suppose one officer of that road tells me that an engine is pulling 2,000 tons. I take it as gospel truth, but in looking into the matter find that that is paper tonnage.

There is another thing that tonnage may be used for, and that is in rating trains. I was on the committee which introduced the tonnage rating of engines on the Burlington road and watched the operation of it, and I came to the conclusion, and I think everyone has come to the conclusion that, considering that it is a considerably more laborious way of determining the number of cars put into a train, that it is not worth the candle on a level grade line. I think when it comes right down to it, on a level line with no grades, that the old method of rating by loaded cars and empty cars is quite as satisfactory a method and quite as accurate a method of determining what the engine will do as the tonnage rate. Mr. Quereau says that you have got to make an allowance of 56 per cent. for empty cars, and as I have suggested before, he does not say what allowance should be made for part of an empty car, but the main roads, whether they make an allowance or not, put a limit on the length of trains for empty cars. That is, they say if an engine will haul 1,500 tons, that is, tons of load, they limit the length of train to 60 and 70 cars.

I want to ask Mr. Quereau one question: Is it his idea that the empty and loaded car statistics should be dropped?

Mr. C. H. Quereau: That would be determined by the management of the road. The statistics which are kept on the car-mile basis or the mile basis must be kept for one year after the ton-mile basis is in use in order to afford a basis of comparison and bridge over the period made necessary by starting in on the ton-mile basis. If it is desirable to keep it after that, well and good, but it should be done if you want to keep a continuous comparison of your record. I was instrumental in introducing the ton-mile statistics on the Burlington & Missouri River in 1896; at the end of the year 1896 we kept our engines on the engine-mile basis as well as on the ton-mile basis. That afforded us a chance for a comparison and no break.

There are one or two points I want to call attention to, and, by the way, rather a distinction should be made; this paper does not refer to tonnage rating, but it refers to ton-mile statistics. In tonnage rating I do not see anything to be gained in including the engine and the way car, but in ton-mile statistics, which should be a measure of the work done by the locomotive, I can see no good reason, even in spite of the arguments which have been advanced, why these should not be included. For instance, the argument has been presented that the management is interested in knowing what certain heavy engines are pulling behind the tender; they can easily determine that, and the fact that the way car is included in the ton-mile will not prevent the larger engines from making a better showing and showing that they pull more tonnage. In fact, if anything, it will slightly exaggerate. With modern designs the rate of the train behind the engine will be increased in weight in proportion to the weight of the engine itself, because I do not think there is anybody designing an engine to-day who would not give it all the cylinder power which is warranted by the circumference of the driver. So that, including the way car in no way varies the result as to what the larger engines are doing.

I claim that instead of assuming that we should do so and so because the general manager wished to make comparisons of different roads, or wished to do this or do that, the logical thing is to inform him

that such and such a comparison is not a wise one and that reasonable conclusions cannot be made by such comparison. The manager simply takes the statistics of his operating officers and those presented to him by the operating officers of other roads. He has not time to see that the basis is a correct one. Under the circumstances the logical thing is to present the matter in the true light, at least the true light as it appears to us concerning the reasonableness, or what is to be obtained by making these comparisons.

One of the speakers said that he did not quite see how the ton-mile basis was applicable to work trains. That system of basing work trains on the ton-mile has been in operation since 1896 on one road. He says, yes, you can do that, but what is the good of it? My reply is what is the good of giving an arbitrary ten miles an hour to a work engine as a credit against which to charge coal, and in this regard it seems to be much more logical and reasonable to give an engine credit for the ton-mileage that actually belongs to it; it takes out so many tons and travels so many miles. The chief point in that, however, is to put all the statistics of the motive power department, so far as engine performance is concerned, and costs, on the same basis. The same thing applies to the switch engine. The main object in doing that is to keep all the motive power statistics on the one basis of cost per ton-mile for supplies and for wages.

#### Weight of Mails.

In the 35 days ending Nov. 6, 1899, the Postmaster-General had every postmaster in the United States weigh the mails sent out from his office, and a report has been issued giving the results of this weighing. Out of the total of 74,684 post-offices in the country only 2,015, all small offices, failed to report; and for these offices estimated figures have been used. The report shows, separately (1) first-class matter, (2) second-class, (a) postage paid and (b) free; (3) third- and fourth-class. (4) Government matter and (5) pouches. The statistics are given by states and also divided according to the 11 divisions of the railway mail service. The estimate for a whole year, based on the 35-day experiment, is shown in the following table:

TABLE C.—Estimate of the total amount of mail matter originating in the United States, by classes, and the proportion of the same sent to railroads.

Class.	Weight for 35 days.	Amount sent to railroads.	Difference, local mail.	Percent. railroads.
	Pounds.	Pounds.	Pounds.	
First class .....	94,888,341	72,637,686	22,250,755	76.55
Second class .....	394,417,535	351,747,706	42,669,729	89.79
Third and fourth class .....	32,750,550	20,032,509	12,718,041	61.16
Government, free .....	145,874,518	125,838,025	20,036,493	86.28
Government, paid .....	96,132,692	86,466,748	9,665,944	89.94
Equipment (pouches, etc.) .....	801,602,902	652,063,970	149,538,932	81.34
Foreign .....		8,348,582		100.
Total .....	1,565,686,508	1,347,145,180	218,541,328	86.04

A second table is given showing the amount of mail matter originating at each of the 175 first-class post-offices in the country, for the 35 days, and with an estimate for a whole year. It appears that the matter on which there is no revenue, which includes newspapers transmitted within the country where published, Government free matter, and the mail bags, makes up no less than 59.43 per cent. of the total weight. In matter sent from offices in the District of Columbia the non-paying matter calculated on this basis, amounts to 87 per cent.; in the State of Mississippi to 85 per cent., and in Indian Territory to 89 per cent. In New York it is only 30 per cent. and in Illinois 32 per cent.

The total quantity weighed in 35 days amounted to 151,132,405 lbs. Of the total amount 6.06 per cent. is first class, 25.19 per cent. second class, 20.9 second class free, 9.32 per cent. third and fourth class, 6.14 Government free, and 51.2 equipment. During the 35 days' weighing New York furnished 16,440,372 lbs., Chicago 9,628,207 lbs., Boston 4,053,532 lbs., Philadelphia 3,801,364 lbs., St. Louis 3,410,279 lbs. and Washington, D. C., 3,244,211 lbs.

#### New York's Canal Problem—A Discussion of the Report of the Advisory Committee.

By William G. Raymond.\*

[Continued from Page 133.]

But even the argument for the railroad might be considered of little importance, if a permanent ultimate saving is to be brought about in the cost of transportation; and the State may believe that it is worth while to pay the largest portion of this in order to bring it about. But why? The Committee asserts the belief that the freight rate of  $2\frac{1}{4}$  to  $2\frac{1}{2}$  mills a ton-mile quoted at times by the railroad is probably a rate bringing loss to the railroad—that is, that the actual cost of rail transportation is in excess of this sum. Estimating the canal cost at one and one-half mills, there is plainly an ultimate sav-

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ing. If this is true, why have the canals free? If the canal transportation company can pay the cost of maintenance and interest, and still quote a rate far below the railroad, why should the State assume a portion of the cost?

It will be presently shown that rail transportation is probably as cheap as canal transportation. It must follow, if this is so, that any expenditure for the canal is so much waste.

But suppose for the moment that the actual cost of transportation by the canal is reduced to  $\frac{1}{2}$  or  $\frac{2}{3}$  of a mill per ton-mile. Does anyone suppose that any such rate will be quoted? The formation of suitable transportation companies under the proposed scheme of operation is of such magnitude that there will be no such no-profit entrepreneur engaged in the business as now swings the rudder of an Erie canal boat. Moreover, does anyone believe that if the railroads suppose their business is to be damaged, they will stand passively by and see it go? It has been truly said that where combination is possible there can be no competition. Combination will be possible with any new transportation line across the State of New York. Combination is only impossible when the competitors are very many and some of them are of the no-profit order of employers. Are any more of this kind wanted? In combination it is the line with most disadvantages that fixes the rate.

The cost of transportation by rail is yet to be considered. If the probable freight tariff for the canal is to be based on the actual cost of transportation, it should be compared with the probable tariff on the railroad based on a similar estimate of cost. The estimate that will be given will not be from an estimate only of what rail transportation might cost on some railroad not built, but will be based on the known cost of operation on the New York Central Railroad.

Many persons will be surprised and perhaps skeptical when it is asserted that the cost of carrying wheat in fully loaded trains on the New York Central Railroad can be brought to less than one mill per ton-mile, and perhaps to less than one-half mill per ton-mile. This estimate may be in error; it is that of a theorist. Improvements in roadbed and rolling stock have resulted in trains now run on this road carrying 2,400 tons of paying freight. It is possible with modern cars and locomotives to carry 3,000 tons of paying freight in one train. The cost of running one train-mile averages on the New York Central a trifle under 98 cents. This includes the cost of operating the very fast passenger trains, which an officer of the road has testified probably cost with their portion of fixed charges, fully \$2 per train-mile. Over 50 per cent. of the train-miles on this road are passenger train-miles, but not all of them cost so much as these fast trains. When fixed charges are added to operating expenses, so that absolutely every expense connected with the operation of the road, terminal expense, administration, and much that has no part in the running of through trains, is included, the average cost per train mile may be taken at \$1.44. If passenger train-miles are 50 per cent. of the whole, at \$1.22 a train-mile, the freight train-miles cost \$1.66. This is probably not quite correct, because railroad book-keeping has not been reduced to the scientific precision of modern shop accounts, and the actual cost of various kinds of service is not well known. Only averages are known. As averages are generally taken, \$1.66 is too low a figure to use for such heavy trains as are now under consideration. It is very probable that such a train can be handled for \$2 a train-mile, including all fixed charges. The portion of this expense that belongs to this through service, and the portion of other service, averaged in but not pertaining to this through service, are such that it is almost certain that the cost of these through trains does not exceed \$1.80 cents, and may be as low as \$1.50 or lower. With 3,000 tons of paying freight in a train the cost per ton-mile is thus seen to be from 0.5 of a mill to 0.6 of a mill. The train may go back to Buffalo empty and still leave the cost per ton-mile as low as by canal or lower. Look at it as one may, it must appear doubtful if the actual cost of transportation by rail is necessarily greater than by canal.

To the rate determined must be added the terminal cost at New York. This is a large item, much larger for rail shipments than for canal shipments; but as the Committee suggests may be done for canal terminal charges, these charges for rail shipments may be much cheapened. Suppose New York City builds a belt railroad around its docks, elevated so that cars may be run alongside the vessel at the dock and their loads, when of wheat, ore, or coal, dumped directly into the hold. True, this would not help the roads terminating on the Jersey side of the river. The bulk freight shipped by these roads may be handled through elevators, as is much of such freight now handled. It is not to be expected that the Pennsylvania will bring much grain to New York. Suppose New York City gives its dockage charges.

The rate here given for rail shipments is not to be considered as actual cost for all freight, but as the



lowest possible cost for a few trains fully loaded—that is, it is actual cost on the same basis as the figures made for the canal. No one will believe that any such rate is likely to be soon quoted, any more than anyone who believes in the correctness of the Committee's estimate of canal cost will believe that any such rate as one mill per ton-mile is likely soon to be quoted on the enlarged Erie canal. The cost here given is comparable with the whole cost given for canal service, namely, one and one-fifth to one and one-half mills per ton-mile. Is it so strange that President Callaway has said that the State may build its canal but the railroad will carry the freight? and that if the State will pay his company the interest on the \$60,000,000, that company will carry from Buffalo to New York all the grain that offers? Certainly the estimate is sufficiently close to indicate that the rate of 2½ mills need entail no loss to the railroad. The cost of maintaining the Erie canal for the last sixteen years, exclusive of expenditures under the \$9,000,000 act, has exceeded the cost of maintaining the railroads of the State, mile for mile, by 62 per cent. Truly, water transportation is not inherently cheaper than rail transportation.

5. In view of what has been said, it seems doubtful if New York, by enlarging its waterway to the utmost limit can be any surer than now of offering the lowest transportation rate to the seaboard, and there is yet to be considered the competition of Canada. Much stress is laid in the report on the competition of the St. Lawrence route, and deservedly so. No matter what kind of a waterway is made across the State of New York, it is possible for Canada to provide a cheaper and shorter route to English ports, and this particular project is of less capacity than the already projected works of Canada. This being so, by what reasoning does the Committee arrive at the conclusion that the State of New York can be sure it can secure permanently the cheapest freight rate? But suppose it may; is the absence of the canal responsible for the fact that the rail shipments of grain from Chicago to Boston are larger than to New York?

6. The sixth point needs no discussion. That the \$60,000,000 thousand-ton barge canal is the largest possible development of New York's artificial waterway may be granted.

Two further statements of the Committee deserve consideration.

1. After stating that the question confronting us is whether the railroads will be able now or in the early future to reduce the cost of transportation below what is possible on the canals, the Committee says: "If they can do this, then it is obviously unwise and improper to expend any more public money upon a method of transportation which, however important in the past, would no longer be able to compete with other and improved methods." It has been attempted in this article to show that what the Committee believes to be impossible may be readily accomplished, and that therefore the recommendation of the Committee is unwise.

2. The opening sentences of the chapter on finance are lacking in frankness, though probably not intentionally so. It is stated that "much has been said at various times about 'the burden of taxation' for canal improvements and canal expenses, which in our judgment is not warranted by the facts; and it seems to us desirable that there should be a clear understanding of the matter." It is then pointed out that the minor canals have resulted in financial loss, but the Erie has paid a very large return. The wording of the passages leaves the impression that, as a whole, the canals have been profitable aside from the unmeasured benefits due to the development of the State, and that the Erie even down to 1898 has a balance to its credit of about \$20,000,000. Then follows the statement, "It is important this fact should always be borne in mind, that the Erie canal has paid into the State more money by many millions of dollars than has been spent upon it in the aggregate for any and all purposes whatsoever. Were this not the fact, we should not advise its enlargement." If Table 5 of the Committee's report means what it seems to mean, the facts are these: There had been raised by taxation for the canals of the State at the close of 1882, when the tolls were abolished, \$20,005,022 more than the revenue received from the canals. At the close of 1895, before the \$9,000,000 improvement began, the excess had grown to \$43,364,858, and at the close of 1898 the taxes exceeded the receipts by \$50,150,662. This result appears as it does because it includes the interest account which the Committee omits, and it shows how absolutely necessary it is to include such an account in any estimate of cost. It is not altogether clear why the Committee so wholly ignores interest. Certainly no one of its members would omit interest in computing the cost of any proposed private investment in which he might be interested. From the foregoing statement of taxation it will be evident—the figures for the exact truth are not available—that, interest included, the Erie canal alone probably had some balance to its credit at the close of 1882, but that that balance has now been about wiped out, so that it may be asserted with some positiveness that the Erie has not paid to the State many more millions of dollars

than have been spent upon it in the aggregate for any and all purposes whatsoever. How, then, can the Committee advise its enlargement?

If the reasoning of this article is correct, it would seem to be unwise to spend any more public money upon the canals of the State, and it is submitted with some confidence that it is ethically wrong to permit the free operation of the canals now existing, a plan followed, so far as can be learned, by no European country.

These conclusions may be wrong, but they are arrived at by an honest endeavor to determine the position to be taken when the matter shall come before the people for decision.

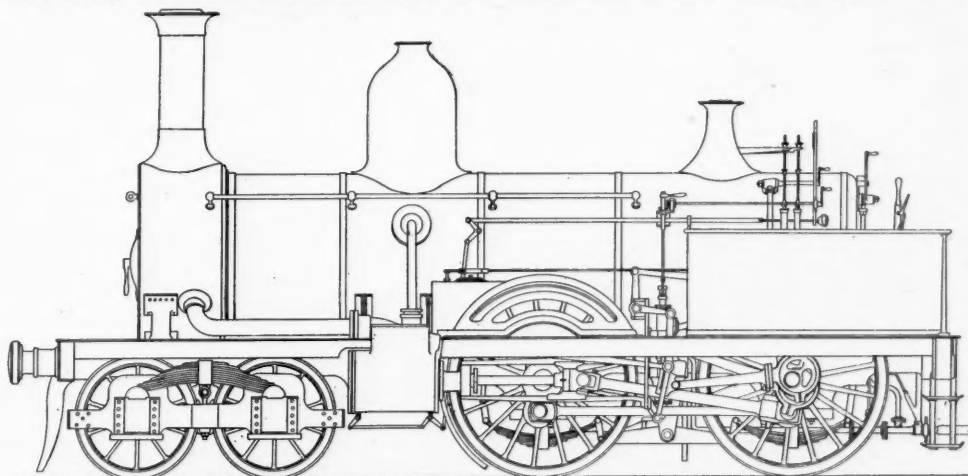
It has been said that many engineers and laborers will be given work if the enterprise is undertaken. But it is pretty well established that the man who labors one day at fair wages on work that yields no adequate return must some time lose a day. It does not appear that any ultimate economy can result from the construction of the canal proposed. What will result if the hopes of the Committee are realized will be a shifting of 60 per cent. of the transportation cost across the State of New York from the producer and consumer to the people of State, for which the people will secure the supremacy of the port of New York and new manufactures. While, if the results predicted in this article obtain, there will simply be sunk in the ground \$60,000,000 of the people's money.

Let the people of New York City see to it that their city is not discriminated against in the fixing of rail rates, and let them come to their senses in their provision for the conduct of transshipment, and they need fear no port in the United States. The Montreal route they cannot hope to better.

#### Four-Coupled Crampton Engines.

By W. B. Paley.

The name of the late Mr. Thos. Russell Crampton is well known to students of locomotive history as that of the designer of the trailing driver engine, with (usually) two pairs of carrying wheels. His engines of this kind, so long used in France and experimented with by many British and some American railways do not need describing, as their details have been published many times of late years as a result of the widely increased interest in locomotive his-



Crampton Locomotive of 1861—London, Chatham & Dover Railway.

tory. It is, perhaps, less known that he designed a class of engines for the London, Chatham & Dover, with coupled wheels, the trailers being the drivers, and a leading bogie. These were among the very first engines the railway ever had, its present title only dating from 1859. The Crampton 4-couplers were built in 1861 and 1862, by three different firms, and originally, like all the Chatham Company's engines, had names. Later on they were numbered 3 to 26. So far as the writer is aware, no drawings of them have ever been published (till now). The cylinders were outside, 16 x 22 in., working trailing drivers of 5 ft. 6 in. coupled to another pair whose axle was in front of the firebox. Compensation levers were used, and Gooch's valve gear. The valves on the top of the cylinders were at an inclination of 14½ in. in 11 ft. 5 in., or nearly 1 in 9½. The coupled wheels were 5 ft. 6 in. diameter, and there was a leading bogie with 3 ft. 6 in. wheels placed only 4 ft. apart, center to center. This bogie had outside springs and frames; it was placed rather far back under the engine and had only a radiating motion round a central pin. Bogies for main-line passenger engines were then almost unknown in Great Britain, and the design is worthy of remembrance if only from this circumstance. The line, however, has more sharp curves in it than most of our through express routes.

Steam was taken off from the dome by pipes which came out through the sides of the boiler, instead of being entirely outside, in the Continental fashion, Cudworth's sloping firebox, as used on the South-Eastern Railway, was employed, enabling the rear or driving axle to be got well under it. The box however, was 8 ft. long by 3 ft. 11 in. wide above

the frames; it contained the usual longitudinal mid-feather of Cudworth's system, requiring two fire-doors side by side. It was usual to fire these grates alternately, with the idea of making each consume the smoke from the other in turn. The mid-feather stopped short of the tubes, but below them was continued to the water-space. Neither the Chatham nor any large English line applied Cudworth's fire-box extensively, except the South-Eastern, of whose Locomotive Superintendent it was the invention. The box had 130 sq. ft. of heating surface, which was an unusual amount at that time, the boiler, which was 10 ft. 3 in. x 4 ft. 3 in., having 1,070 ft. more, or 1,200 in all. The base from the bogie pin to the center of the front coupled axle was 9 ft. 9 in., making a total wheel base of 18 ft. 11 in. Six-wheeled tenders running on 4-ft. wheels were used, but were small even for that time, holding only 1,560 gallons of water.

For some reason or other the engines were very unsatisfactory, damaging the road severely. In fact, two or three bad accidents were attributed to their having gone over the line previously to the accident to a train coming after them. In 1864 or thereabouts the Crampton coupled engines were all rebuilt as 5 ft. 6 in. coupled behind, with outside frames and inside cylinders, the bogie being taken away and a single pair of leading wheels substituted. As thus altered, some of them are still at work. A class of five 6 ft. 6 in. single-driver Cramptons, which followed these in 1862, were equally unsatisfactory and were soon rebuilt as 6 ft. 6 in. coupled, with outside frames, retaining the bogie. These are all, or were very lately, still running. A dummy axle in front of the firebox was originally used in them to work the trailing wheels by outside rods, inside cylinders being used. Ordinary rectangular fireboxes were put into both classes when rebuilt.

Chelsea, London S. W.

#### Train Accidents in the United States in January

##### COLLISIONS.

##### Rear.

1st, on Pennsylvania road, near Gallitzin, Pa., a westbound freight train broke apart in two places and the middle portion, consisting of 20 cars, ran uncontrolled to Cresson. At this point the engine-man, seeing a crowd of passengers in front of the station, slackened his speed and was run into by the uncontrolled cars, making a bad wreck. The

wrecked cars fell against two passenger cars, containing 18 passengers, and six of these persons were injured.

3rd, on Illinois Central, at Centralia, Ill., a passenger train ran into the rear of a preceding freight train, damaging the engine and several freight cars. The wreck took fire and a large part of it burned up. The engineman was injured.

3rd, 8 p. m., on Wisconsin Central, at Trout Brook Junction, Minn., passenger train No. 2 of the Chicago Great Western ran into the rear of a freight train of the Northern Pacific, wrecking the caboose and a carload of horses. The conductor and five drovers were injured.

8th, on Chicago, Burlington & Quincy, near Mendota, Ill., a freight train was run into at the rear by a following freight, and the caboose was wrecked. One drover in the caboose was killed and five drovers and two trainmen were injured.

11th, on Philadelphia, Wilmington & Baltimore, near Eddystone, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking three cars. A brakeman was injured.

16th, on Baltimore & Ohio, near Fairchance, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 15 cars. A brakeman was killed.

16th, on New York, Susquehanna & Western, at Deckertown, N. J., a passenger train ran over a misplaced switch and into some freight cars standing on the side track. A passenger was injured.

17th, on New York, New Haven & Hartford, near Valley Falls, R. I., an empty engine ran into the rear of a preceding passenger train, injuring two trainmen.

19th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Rockford, Ind., an empty engine ran into the rear of a freight train which was taking water and several cars were wrecked. Three trainmen were injured.

19th, on Brooklyn Elevated, at Brooklyn, N. Y., a passenger train ran into the rear of a preceding passenger train, damaging the cars considerably. Ten



passengers were injured, but none of them seriously. There was a dense fog at the time.

20th, on New York Central & Hudson River, at Castanea, Pa., rear collision of freight trains, wrecking eight cars and one engine. One engineman was injured.

24th, on Louisville & Nashville, at Columbia, Tenn., a freight train approaching a station at uncontrollable speed ran into the rear of a preceding freight, wrecking seven cars; one trainman injured.

24th, on Central of New Jersey, near White Haven, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking several cars. A brakeman was killed.

26th, on West Virginia Central, near Cumberland, Md., a freight train which had become stalled on a curve was run into at the rear by a following freight. Three cars were damaged and three trainmen injured. It is said that the flagman of the foremost train went back with his signal, but that in consequence of a blinding snowstorm he was not seen.

27th, on Chicago, Burlington & Quincy, near Lynden, Ill., a mixed train broke in two and the rear portion afterward ran into the forward one, injuring two passengers and four trainmen.

27th, on Pennsylvania road, near Stewart, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, derailing a dozen cars. A brakeman was injured.

27th, on New York Central & Hudson River, near Lock Haven, Pa., a freight train ran into the rear of a preceding freight, wrecking the caboose and seven cars. Two trainmen were injured.

28th, on Illinois Central, at Tara Junction, Ia., an empty engine ran into the rear of a preceding passenger train, crushing the rear passenger car, which, however, was empty.

28th, on Philadelphia & Reading, at Wernersville, Pa., a freight train standing at the station was run into at the rear by a following freight and the caboose and several cars were wrecked. One trainman was injured. It is said that the flagman did not go back soon enough.

31st, on Plant System, near Tampa, Fla., a passenger train ran over a misplaced switch and into a freight train standing on a side track, making a bad wreck, the first four cars being overturned. The engineman, one passenger, and a tramp were killed and a boy in the mail car was fatally injured. Six other passengers were injured.

31st, on Duluth, South Shore & Atlantic, at East Houghton, Mich., a passenger train standing at a water tank was run into at the rear by a following passenger train and a sleeping car and several other cars were badly damaged. There was a blinding snowstorm at the time.

And 22 others on 18 roads, involving 2 passenger and 33 freight and other trains.

#### Butting.

2nd, on Western New York & Pennsylvania, at Lime Lake, N. Y., butting collision between an empty engine and a snow plow; two trainmen injured.

9th, on Illinois Central, at Moffat, Tenn., collision between a passenger train and a freight train, damaging both engines, the baggage car and several freight cars. The engineman of the freight was killed. There was a dense fog at the time. It is said that the freight conductor miscalculated the time at which he should clear the passenger train.

13th, 8 p. m., on Louisville & Nashville, near Hopkinsville, Ky., butting collision of freight trains, badly damaging both engines and eight cars. Two trainmen were injured.

31st, on Wabash road, at Peru, Ind., a locomotive standing at a tank unattended was in some way started forward; and, with a dead engine, which was coupled to it, in front, ran to a point about six miles west of Peru, where in eastbound fast freight was met. The collision wrecked three locomotives and several cars, including two cars of whiskey, which took fire. The engineman and fireman of the freight jumped off and were injured.

And 7 others on 6 roads, involving 3 passenger and 11 freight and other trains.

#### Crossing and Miscellaneous.

1st, 1 a. m., on Chicago, Burlington & Quincy, at Neponset, Ill., an eastbound freight train which had just entered the side track to wait for the fast mail was allowed to run too far and fouled the main track at the outgoing end of the siding; and a second eastbound freight came along just at that time and collided with the engine of the first train, killing a brakeman. Two other trainmen were injured. It is said that the men in charge of the first train expected that the second one would follow them into the side track.

3rd, on Cornwall & Lebanon, near Lebanon, Pa., a switching engine collided with some freight cars; three trainmen injured.

4th, on Chicago Great Western, near Winston, Ill., a freight train which had been stalled in a tunnel was backed out and ran into a following passenger train, which, however, had been stopped and had begun to move backward. One passenger (on the freight) and one trainman were slightly injured.

6th, on Southern Railway, near Avenstoke, Ky., an eastbound freight train, entering a side track, was run into by a westbound freight, and both engines were badly damaged. Both enginemen were injured.

6th, on Missouri, Kansas & Texas, near Sadler, Tex., collision between a freight train and a work train, badly damaging three cars. A brakeman was injured.

7th, on New York Central & Hudson River, at Buffalo, N. Y., collision between a passenger train and a switching engine; one engineman injured.

7th, 7 p. m., on Rio Grande Western, at Farmington, Utah, passenger train No. 4 collided with a freight train which was entering a side track. A fireman was injured. There was a dense fog at the time.

8th, 8 p. m., on Norfolk & Western, near Pulaski, Va., passenger train No. 13, running at full speed, collided with some freight cars which, being insufficiently braked, had run out upon the main track from a siding. The engine and mail car were wrecked; the engineman and fireman were injured, the latter fatally. A tank house was badly damaged.

13th, on Southern Pacific, at Colma, Cal., collision between a passenger train and a switching engine; one trainman injured.

16th, on Chicago & Northwestern, near Amber, Ia., collision between a passenger train and a live stock train; five trainmen were injured.

18th, on New York Central & Hudson River, at High Bridge, N. Y. City, collision between a freight

train and a switching passenger train, due to a misplaced switch. One trainman was injured.

18th, on Great Northern, at Hillyard, Wash., collision between an empty engine and a passenger train, injuring five passengers.

20th, on Lake Shore & Michigan Southern, at Air Line Junction, O., collision of freight trains, doing considerable damage. A fireman was fatally injured and three other trainmen were hurt.

20th, on Illinois Central, at Fulton, Ky., a car containing passengers, which was being moved by a freight train, was damaged by a slight collision, due to the failure of a drawbar, and two passengers were injured.

20th, 6 p. m., on Grand Trunk, at Port Huron, Mich., an empty passenger train, moving backward, collided with a locomotive which was standing on the main track, doing slight damage. A brakeman on the rear car of the passenger train and the engineman of the standing engine were killed. The engine was without tail lights.

22nd, on Central of New Jersey, at Ashley, Pa., a freight train descending a grade became uncontrollable and collided with two locomotives standing on the main track near a roundhouse. The collision made a bad wreck and was immediately followed by a disastrous explosion of dynamite, of which there was a considerable quantity in one of the cars. The roundhouse, a large water tank and seven locomotives were badly damaged. Six persons were killed by the explosion and seven were injured. Damage was done to many cars and buildings for some distance around.

25th, 1 a. m., on Norfolk & Western, near Coaldale, W. Va., a westbound freight train which had become uncontrollable on a descending grade collided with an eastbound freight standing on the westbound track, badly damaging three locomotives and several cars. One trainman was killed.

25th, 7:30 a. m., on Savannah, Florida & Western, at Waycross, Ga., a special passenger train carrying excursionists from Indiana collided with a freight train, and several cars were damaged. Fifteen passengers were injured, one of them fatally. There was a dense fog at the time. It is said that the special train was the second section of a regular, and that the men in charge of the freight train assumed that the track was clear after the passage of the first section. The collision occurred within a few yards of the railroad company's hospital.

27th, on Philadelphia & Reading, near Allentown, Pa., collision between a passenger train and a switching engine, badly damaging both engines and one car. Four trainmen were injured.

27th, 10 p. m., at Fairfax, S. C., freight train No. 141 of the Southern Railway ran into the rear of freight No. 46 of the Charlestown & Western Carolina, wrecking the caboose and one loaded car. One trainman was injured.

31st, 5 a. m., near Columbus, O., passenger train No. 105 of the Baltimore & Ohio collided with a baggage car standing on the Ohio Central, at the crossing of the two roads. It is said that a switching crew left the baggage car standing on the crossing unattended and that the signalman gave a clear signal to the Baltimore & Ohio train while ignorant of the presence of the baggage car.

31st, on Baltimore & Ohio, at Rowlesburg, Md., collision of freight trains, wrecking four cars; one brakeman was killed. The wreck took fire and was mostly burned up.

And 32 others on 25 roads, involving 7 passenger and 50 freight and other trains.

#### DERAILMENTS.

##### Defects of Roadway.

2nd, on Pontiac, Oxford & Northern, near Pontiac, Mich., a mixed train was derailed by a broken rail and the passenger car was overturned. Three passengers were injured.

5th, on Wisconsin Central, near Chippewa Falls, Wis., a freight train broke through a bridge and 17 cars were wrecked. One car contained oil, which took fire and exploded; and the whole of the wreck was burned up.

15th, on Chicago, Burlington & Quincy, near Horton's, Ill., a mixed train was derailed by a broken rail and one passenger car, one baggage car and two freight cars were badly damaged. The conductor was injured.

28th, on Western New York & Pennsylvania, at Tuscarora, N. Y., a car in a freight train was derailed and, with several others, fell into the ditch. A car of oil was broken open and the oil ran out and flowed down to a creek. The oil took fire and a second tank exploded. One employee was badly burned. It is said that the derailment was due to a broken rail.

And 16 others on 15 roads, involving 3 passenger and 13 freight and other trains.

##### Defects of Equipment.

7th, on Pennsylvania road, near Leaman Place, Pa., a freight train was derailed by a drawbar which was pulled out and fell on the track, and nine loaded cars were wrecked. A brakeman was injured.

23rd, on Philadelphia, Wilmington & Baltimore, at North East, Md., a freight train was wrecked by the breaking of a journal which became heated, and several cars were slightly damaged. The fireman of a following freight train, which was flagged, feared that his engine would run into the standing train, and he jumped off and was injured.

And 40 others on 33 roads, involving 3 passenger and 37 freight and other trains.

##### Negligence in Operating.

24th, on Buffalo, Rochester & Pittsburgh, near Clarion, Pa., 12 cars in a freight train were derailed and badly damaged in consequence of a load of lumber on one of them striking the roof of a tunnel.

30th, on Erie road, near Kent, O., an engine and caboose, moving backward, were derailed at a derailing switch and the engine was overturned. Five trainmen were injured.

31st, on New York Central & Hudson River, near Tladaghton, Pa., a freight train was derailed at a point where a rail had been taken out by track repairers, and the engine fell down a bank. Fifteen loaded cars were wrecked. The firemen were killed.

And 10 others on 9 roads, involving 3 passenger and 7 freight and other trains.

##### Unforeseen Obstructions.

3rd, 10 p. m., on Wabash road, at Wellsville, Mo.,

a fast mail train was derailed by running over a cow; the fireman was killed and the engineman injured.

8th, on Rio Grande Western, near West Water, Utah, passenger train No. 1 was derailed by a landslide and the engine was ditched. The fireman was killed and the engineman injured.

11th, on Houston & Texas Central, near Bryah, Tex., a freight train was derailed at a washout and three trainmen were injured.

11th, on Southern Railway, near North Birmingham, Ala., a freight train was derailed by a landslide and the engine and three cars were ditched. The engineman and fireman were injured.

25th, on Colorado & Southern, near Gunnison, Col., a mixed train was derailed by running over a burro and the engine was ditched. The engineman and fireman were injured.

And 14 others on 11 roads, involving 6 passenger and 8 freight and other trains.

#### Unexplained.

13th, on Atlantic Coast Line, near Denmark, S. C., a freight train was derailed at a switch and the engine and 10 loaded cars were wrecked. The engineman was injured.

13th, on Louisville & Nashville, near Georgiana, Ala., a freight train was derailed and the engine and four cars were wrecked. A trainman was killed and another injured.

27th, on Atchison, Topeka & Santa Fe, near Kildare, Okla., a freight train was derailed and several cars were wrecked. One brakeman was killed and two were injured.

And 47 others on 30 roads, involving 5 passenger and 42 freight and other trains.

#### OTHER ACCIDENTS.

3rd, on Pennsylvania road, near Williamsport, Pa., the engine of a passenger train was damaged by running against a water crane which had been left aloft of the track. The engineman was injured.

23rd, on Brooklyn Elevated, at Flatbush and Atlantic avenues, Brooklyn, a motor car in a passenger train was disabled by the blowing out of a fuse and the motor car was set afire and badly damaged.

27th, on Grand Trunk Railway, near Edwardsburg, Mich., the locomotive of a freight train was wrecked by the explosion of its boiler; engineman and conductor and two other persons were injured.

28th, on Boston & Maine, near Riverdale, N. H., the locomotive of a milk train was badly damaged by the breaking of a parallel rod, and the engineman was injured.

31st, on Norfolk & Western, near the Betty Bates Mines, Va., two cars broke away from a freight train and ran back at high speed down grade. When the cars became uncontrollable the brakeman on them jumped off. After running about a mile the cars struck a hand car on which were four men. Three of these were killed and the fourth was injured.

And 4 others on 3 roads, involving 4 passenger trains.

A summary will be found in another column.

#### Improvements on the Metropolitan Street Railway, New York.

The Board of Directors of the Metropolitan Street Railway Company, New York, has adopted the recommendations of President H. H. Vreeland to spend from eight to ten million dollars in improvements and extensions of the surface lines now controlled by the company. The work of electrifying the present cable roads on Broadway, Columbus and Lexington avenues will be begun next month. President Vreeland's plans for the charges and improvements are as follows:

First. The new electrical power station of the company, at Ninety-sixth St. and the East River, has been built, and is now turning out a large amount of electrical power, and will by the middle of the coming summer generate sufficient power to operate all of the lines of the company on Manhattan Island. It is proposed to change the entire cable system to the standard conduit electric construction now in operation on the principal lines of the system.

Second. The motive power of the Thirty-fourth St. crosstown line will be changed. This is one of the most important crosstown lines of the company's system now unimproved, and improvement of its facilities would add largely to the earning capacity of this line.

Third. The present track construction of the Twenty-eighth and Twenty-ninth St. line, which was built for horse cars and which is too light for the heavy type of air cars now used, will be reconstructed with standard 9-in. girder rails.

Fourth. The Sixth Ave. line to the Christopher St. ferry will be extended by building a short spur from Sixth Ave. and Eighth St. to Christopher St. ferry.

Fifth. President Vreeland recommends the completion and opening of the line in Broadway from Fifty-ninth St. to Sixty-fifth St., which the company has a right to operate through an arrangement with the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, and which would shorten up the time and greatly facilitate the movement of the upper West Side business.

Sixth. It is proposed to rebuild the One-hundred-and-thirty-fifth St. line, between Madison and Eighth Aves., which would form a connection between the Madison, Lenox and Eighth Ave. lines of the system.

Seventh. As soon as the necessary legal steps are completed, the new lines which the company has recently secured from the city, in the Boulevard, between One-hundred-and-thirtieth and One-hundred-



and-seventy-fifth sts., and in One-hundred-and-forty-fifth St., from the Boulevard to Lenox Ave., will be built.

Mr. Vreeland says that the work of changing the motive power from cable to underground trolley on the Broadway, Columbus Ave. and Lexington Ave. lines will be begun in April, and take not longer than three months. The company now has 75 per cent. of the materials needed for the work stored in its yards in the city. The steel and most of the other materials were bought under contract more than a year ago, previous to the rise in prices. Compressed air cars will be used on crosstown lines, the tracks of which will be relaid. No more electrical crosstown lines will be built by the company, because of the increased cost of construction due to relaying water pipes and gas pipes in the cross streets.

### The Hardie New Valve Gear.

Mr. Robert Hardie has invented a new valve gear for his compressed air motors, and is having it put on a 60-ft. car now being built at Rome, N. Y., and later it will be applied to the street cars equipped with the Hardie air motors. The object sought in the invention was to obtain an arrangement whereby a cut-off valve could be worked in conjunction with the main valve by one lever. The new gear gives a cut-off (including clearance) at any desired point between  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  stroke. In the position of earliest cut-off there is also the greatest amount of lead, as has been shown by a working model of the gear.

A regular Stephenson link with a fixed cut-off (from  $\frac{1}{4}$  to  $\frac{1}{2}$ ), worked by separate eccentrics, was formerly used on the Hardie cars. While a late cut-off results in a greater consumption of air than an early cut-off, the advantage comes in being able to adopt smaller cylinders. We defer illustrating the new gear until the foreign patents have been granted.

The figures in the accompanying table were calculated from valve and piston movements of the model. The indicator cards for each of the three positions of the reverse lever, as here shown, were drawn from calculations based on the figures obtained from the actual movements of the piston and valves of the model. The expansion curve in each card is between the adiabatic and isothermal.

In the following table are given the openings for every 30 degrees of the main and cut-off valves for three positions of the link, with  $\frac{1}{4}$  inch for both outside and inside lap of main valve, and  $\frac{1}{8}$  in. negative lap of cut-off valve. These figures are for cylinders  $6\frac{1}{2} \times 12$  in., and admission ports  $2\frac{1}{4} \times \frac{3}{8}$  in. The inside and outside lap being equal, the main

### Sizes of Freight Cars in England.

A paper on the "Economic Size of Freight Cars" has been prepared for the International Railway Congress by Mr. C. J. Owens, General Manager of the London & South Western. Mr. Owens discusses the subject quite briefly, giving but little beyond a statement of the well-known difficulties which would be encountered if the attempt were made in England to generally introduce long freight cars. In hundreds of freight yards and houses the available room has been so fully utilized that cars have to turn sharp corners, and turn-tables are used. These are all short. Several of the large freight houses in Manchester lie at right angles to the tracks, so that every car has to pass over a turn-table. There are railroad wharves on the Thames in London, where it would be impossible to run cars more than 18 ft. long unless the whole of the tracks were taken up and relaid. At coal mines and other places where large quantities of bulk freight are handled, track scales are common and are constantly used, and these would not take on long cars. Besides the railroads there are the owners of private sidings to be dealt with; these parties would make strenuous objection to any alteration involving expense.

The British railroads are retailers; that is to say, they handle freight in much smaller units than the American roads. Before railroads were built, carriers' carts were the ordinary means of transport in England, and freight cars were designed to take the place of these carts. To this day, a part of a certain London freight house is called the "carriers' shed." Rapid transit and prompt delivery are now demanded everywhere in England, and the demands cannot be ignored; this necessitates sending a separate car to each station daily; that is to say, consignees will not put up with the slow movement of a local freight train, making long stops at stations to unload. The practice of ordering goods in small quantities is increasing largely and the average weight per consignment is constantly decreasing. While the capacity of cars is from 8 to 10 tons, the average load of general merchandise is only from 2,800 lbs. to 4,480 lbs.

Profitable return loads are more easily secured if the car is small. Even in the grain and lumber traffic the usual carload is not over six tons, and in many cases is nearer two tons; and although the railroads have made special reductions to induce grain shippers to send larger loads, the experiment has been a failure.

The railroads have done their part toward securing more economical freight service, and have even introduced long cars of large capacity wherever possible. The Caledonian is now building some large

and its outside dimensions are 16 ft. long and 7 ft. 8 in. wide; inside, 15 ft. 6 in. long, 7 ft. 2 in. wide. The height of the sideboard is three feet. The standard covered car is 10 ft. 7 $\frac{1}{2}$  in. high from the rail to the roof. The 10-ton standard car of the London & South Western weighs 12,992 lbs., is 15 ft. 4 in. long, 7 ft. 11 in. wide and 6 ft. 11 in. high. The covered car of the same capacity weighs 15,904 lbs., is 18 ft. long and 11 ft. 2 in. high (rail to roof).

### A Belt Conveyor.

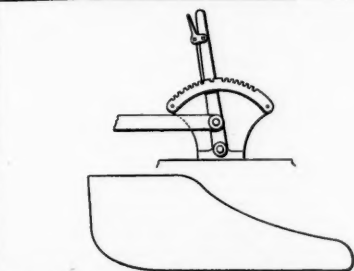
During the annual meeting of the American Society of Civil Engineers in New York City last January the members were invited by Mr. A. McC. Parker to visit his works at Thirty-eighth Street and Seventh Avenue to see the working of a rubber belt conveyor used in handling material which is being excavated and delivered on scows in the river. In the discussion Mr. Parker said:

"The problem was presented to us there of getting out some 25,000 or 30,000 yds. of material very rapidly from a deep excavation. We installed, for that purpose, a rubber belt running on rollers, which were troughed so as to make the belt carry more than it would if flat. It was put up very hurriedly. It was driven by a 9 x 12 engine, and has been delivering material into scows lying at the foot of the property, at the rate of 450 or 500 yds. in five hours, at the rate of 100 yds. an hour; using 12 scraper teams to put it on the belt. I think it is something new in this part of the world, and that the application of such a contrivance is new in handling material in that line of work."

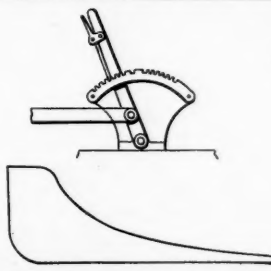
The belt is 32 in. wide. It runs over troughed rollers or idlers, making the belt about 8 in. in depth, about 12 or 14 in. wide at the bottom, and then curving up on the sides. The material is delivered to the belt through four hoppers which are about 3 ft. above the top of the belt, making the whole arrangement about 4 ft. in depth. We dump into it as fast as we can drive the teams over the hopper, and there is no apparent limit to what the belt will carry off. It takes just as fast as we can drop the  $\frac{1}{2}$ -yd. scrapers on to the belt. It takes anything you can get on to it. You can put on stones which take two men to lift which will go on at a speed of 400 ft. a minute, and mount up an incline of 26 degrees without any effort, and with no tendency to run down the incline. The belt has a total carry from the head pulley to the out-board pulley of about 225 ft. We have a square, 200 x 272, to excavate. Now, the bottom of the belt at the upper end of the lot is about 14 ft. below where the material is delivered, so as to shoot off and fill these broad dumping scows. We rise as we go up about 14 ft. But it does not make any difference whether it is

### RESULTS OF DISTRIBUTION OBTAINED BY THE HARDIE VALVE GEAR.

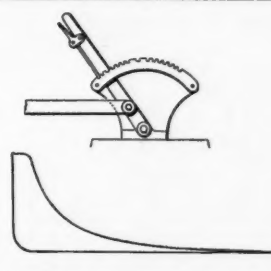
Crank angle, deg.	First position. Main valve (full) travel, 2 in.; cut-off valve travel, 2 in.						Second position. Main valve travel, 1 $\frac{1}{2}$ in.; cut-off valve travel, 1 $\frac{1}{2}$ in.						Third position. Main valve travel 1 in.; cut-off valve travel, 1 $\frac{1}{2}$ in.					
	Cut-off valve opening, in.		Main valve opening, in.		Piston travel, in.		Cut-off valve opening, in.		Main valve opening, in.		Piston travel, in.		Cut-off valve opening, in.		Main valve opening, in.		Piston travel, in.	
	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.	Front.	Back.
0.....	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	.0	.0	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	.0	.0	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	.0	.0
30.....	0	0	$\frac{3}{8}$	$\frac{1}{2}$	.94	.67	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	.94	.67	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	.34	.67
60.....	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	3.39	2.62	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	3.39	2.62	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	3.39	2.62
90.....	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	6.53	5.48	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	6.53	5.48	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	6.53	5.48
120.....	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	9.39	8.62	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	9.39	8.62	$-\frac{1}{8}$	$-\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	9.39	8.62
150.....	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	11.33	11.06	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	11.33	11.06	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	11.33	11.06
180.....	$\frac{1}{8}$	$\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	12.00	12.00	$\frac{1}{8}$	$\frac{3}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	12.00	12.00	$\frac{1}{8}$	$\frac{3}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	12.00	12.00



Main cut-off and compression crank angle, 117°. Lead angle of crank: Front, 18°; back, 18°. Point of cut-off not including clearance  $\frac{1}{2.42}$  of stroke. Point of cut-off including clearance  $\frac{1}{2.29}$  of stroke. Greatest port opening,  $\frac{1}{8}$  in. Relative travel of main and cut-off valves, 1 $\frac{1}{2}$  in.



Main cut-off and compression crank angle, 138°. Lead angle of crank: Front, 13°; back, 13°. Point of cut-off not including clearance  $\frac{1}{6.29}$  of stroke. Point of cut-off including clearance  $\frac{1}{5.19}$  of stroke. Greatest port opening,  $\frac{3}{8}$  in. Relative travel of main and cut-off valves, 2 $\frac{1}{2}$  in.



Main cut-off and compression crank angle, 148°. Lead angle of crank: Front, 12°; back, 12°. Point of cut off not including clearance  $\frac{1}{14.81}$  of stroke. Point of cut-off including clearance  $\frac{1}{9.54}$  of stroke. Greatest port opening,  $\frac{1}{8}$  in. Relative travel of main and cut off valves, 3 $\frac{1}{2}$  in.

valve compression and cut-off take place at the same point. The greatest port openings are taken at the point where cut-off and main valve openings are equal, the cut-off closing while the main valve is opening. There is always ample exhaust opening. The readings in the table were taken (for convenience) at equal crank angles, but the valves would be set to cut-off at equal piston movements from each end of the cylinder. The clearance in the cylinder is four per cent. The cut-off, including clearance, as noted under each card, means

$$\frac{\text{Piston travel at cut-off + clearance}}{\text{Stroke of piston + clearance.}}$$

cars for iron ore. The London & South Western is using some cars of 25 tons capacity between London and Southampton. For years the English roads have used low platform cars of great capacity for carrying machinery and special cars are used for large sizes of plate glass. Freight cars 40 ft. long are used to carry two loaded meat vans from the South Coast to London.

Mr. Owens closes his paper with a table showing the standard capacities and dimensions of freight cars on the principal roads. The lowest standard is seven tons, on the London & North Western. On four roads it is eight tons and one five it is 10. The L. & N. W. seven-ton car weighs 11,956 lbs.

14 ft. or 400—this grade of 26°—I believe you could roll eggs up it. It is a most amusing thing to see these round stones going up without any effort and without any tendency to come back.

Take a big stone that it takes two big men to lift, and you would think when it starts up that hill it would want to come back; but it does not; it rides up and that belt goes over the head pulley, which is 4 ft. in diameter, shoots along and disappears. As you stand at the side of this 4-ft. pulley and look at it, the belt coming up at an angle of about 26°, you would naturally expect the material to fall down as soon as it gets up to the top of the hill. But it does not do that. It keeps on going.





ESTABLISHED IN APRIL, 1856.  
PUBLISHED EVERY FRIDAY,  
At 32 Park Place, New York.

### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The Vladikavkas Railroad, bonds of which are reported to have been sold in this country, is, for the most part, a comparatively old line, extending from the port Rostof, where the River Don empties into the Sea of Azof, southeastward to the foot of the Caucasus at Vladikavkas, 434 miles, through a very fertile country. The new part of it is properly an extension from a point 14 miles north of Vladikavkas eastward along the north slope of the Caucasus to the Caspian Sea at Petrovsk, 166 miles; this has been completed a year or two only. A further extension along the coast of the Caspian and around the eastern end of the Caucasus to the petroleum fields at Baku has but recently been completed. The length of it is perhaps 200 miles. It for the first time connects the Transcaucasian Railroad, from the Caspian to the Black Sea, with the railroad system of the Empire; but it is not likely that there will be any great interchange of traffic between them, as they are substantially paralleling lines, though far apart and with the whole range of the Caucasus between them. The new railroad is also, at present, the only rail connection of Russia with the Caspian Sea, the commerce of which, heretofore, has had its outlet chiefly through the great River Volga. It will not be long, probably, before another and more direct railroad will reach the Caspian at Astrachan, following the Volga closely. The immense petroleum trade of Baku will doubtless give the new line a considerable traffic, though very likely most of the petroleum will continue to go up the Volga, while exports by the Black Sea have a much shorter route by the old Transcaucasian Railroad than by the new line, with its terminus at the shallow port of Rostof, which is closed in winter. Passengers, machinery and supplies, however, may, in good part, take the new route. In case of war the new line might have very great importance, especially if the Black Sea were closed to Russia. Not only does it afford a route to the Transcaucasian country, the only one open in winter, but also to the Turkish frontier. That Russia seeks to place loans in this country is probably due to the fact that they are not greatly favored in European money markets. Considerable issues have been placed there, but the demand for them is limited. Russia has its financial reputation yet to make, and English, French and German investors are apt to take into consideration certain contingencies which we do not always have in mind in this country. What would be the effect of a long and costly war, or a series of such wars? The European nations with good credit have stood such tests successfully. Russia, which, until recently, can hardly be said to have had any foreign credit, and so has had little foreign debt, has not yet had opportunity to prove its soundness in times of trouble.

The acquisition of Russian bonds by a life insurance company is a necessity if the company is to do business in Russia, and its investment must be large

if its business is to be large, because Russia, like some other countries, requires that a part, at least, of the premiums received for insurance shall be invested in domestic securities. The statement that the proceeds of the other bonds sold here will go to pay for materials purchased here may very well be true; but the impression given that they go for materials for the Vladikavkas Railroad, which some statements convey, can hardly be true. That railroad is very nearly completed. Russian purchases in this country have been largely for the Siberian Railroad and have been sent chiefly across the Pacific, not the Atlantic. One newspaper has gone so far as to say that coal for the locomotives of the road whose bonds are sold will be bought here. If the Vladikavkas Railroad must depend upon American coal, we fear that its bonds will not be worth much. In that part of Russia, and in many other parts, almost the sole locomotive fuel is petroleum residuum, and this railroad, as we have said, has a terminus directly at the oil wells. Further, the other end of it is on the Don, close to the great Russian coal mines, which would not be thought very great here, however. Russia, like nearly all European countries, unless they have great home supplies, is, for the moment, short of coal, and its indispensable requirements will be supplied where fuel can be had, and little can be had in Europe. Wood, until recently its only fuel, has been growing scarcer and scarcer; the anthracite mines which an American syndicate, some 20 years ago, was to develop into something surpassing the Pennsylvania coal fields, have had a reasonable development, but altogether Russia produces only 14 millions of tons of coal; the petroleum production has increased rapidly, and as the Russian petroleum, as it comes from the wells, yields a much smaller proportion of illuminating oil, and therefore a much larger proportion of residuum than American petroleum, it has an importance as fuel there many times greater than here, supplying all the steamers on the Caspian and the Volga, and most of the locomotives; but as much new railroad has been built, and manufacturing enterprises, including iron works, have increased enormously, the country seems to have overtaken its fuel supply, a matter of great significance for the future of Russian manufactures.

### Some Advantages of Heavy Compound Freight Locomotives.

Judging from the orders for very heavy freight locomotives within the past three years, it would seem that there is a decided preference for simple locomotives for very heavy service on steep grades. Of the notable heavy simple engines built during this time there may be mentioned those for the Burlington & Missouri River, the Mexican Central, Great Northern, Buffalo, Rochester & Pittsburgh, Union Railroad of Pittsburgh, Delaware & Hudson, Delaware, Lackawanna & Western, Pennsylvania Railroad and Illinois Central. The only compounds which approach these in size are the Northern Pacific and Southern Pacific twelve-wheelers, which are practically the same design, and the Lehigh Valley consolidation engines; the Chicago & Eastern Illinois also has some heavy compounds as well as similar simple locomotives.

In this particular it is very much to be doubted whether the practice of the majority should be followed. It is now generally conceded that compounds are best suited to freight service on roads where the grades are light, permitting steam to be worked in the cylinders throughout the run. The saving in fuel in such cases may amount to from 20 to 30 per cent., while, if properly maintained, the cost of repairs to the compound is found to be no more than for simple engines, and in at least one instance the maintenance charges are reported as less for the compound. For freight service on roads with many grades, it has been said several times that the compound is not well adapted; that while it shows superior fuel economy going up hill, the gain is more than offset by drifting down hill, when the strong exhaust from the low-pressure cylinder forces the fire at a time when steam is not needed. The inferior drifting qualities of the compound have retarded its introduction on hilly roads, although indicator cards from recent locomotives show that this objection is now not nearly so serious as formerly.

On the other hand, the experience of the Northern Pacific has shown that the compound is better for heavy work on grades than simple locomotives, irrespective of questions of fuel economy, as the cylinders can be designed to develop a tractive effort of about 25 per cent. of the adhesive weight when working compound; then by changing to

simple working, a tractive effort of from 33 to 35 per cent. of the weight on the drivers is available for slow speeds on a sanded track. A simple engine designed to utilize 33 per cent. of the tractive weight would be very unsatisfactory on account of slipping under ordinary running conditions, but of course the compound at such times would be worked double expansion.

As an instance of how this really works out, a comparison can be made between the Northern Pacific twelve-wheel compound and the Great Northern twelve-wheel simple locomotive. Both are of practically the same power, but the simple engine has 20,000 pounds more weight on the driving wheels than the compound, and even then is said to slip badly. Tests have shown that at three miles an hour the Great Northern engine could exert a cylinder tractive effort of about 51,000 lbs. and the Northern Pacific 50,000 lbs., corresponding respectively to 30 and 33 per cent. of the adhesive weight. As stated before, the Northern Pacific engine, under ordinary conditions, is worked compound, making the tractive effort about 25 per cent., and giving no more trouble from slipping than a simple engine designed according to usual practice.

The point we would like to bring out is that heavy freight locomotives which are to be worked to full capacity on grades can best be compounds; that is, for a given weight on driving wheels, if properly designed, the compound can be made more powerful than a simple engine, and should handle bigger trains, where the engine rating depends on the grades. Where the average resistance of a division governs the rating, and it is purely a question of boiler capacity, the use of compound cylinders is equivalent to an increase in boiler capacity of from 10 to 12 per cent. The ability of the compound to haul heavier trains should more than offset any loss of fuel while drifting, although it is doubtful if such losses really amount to much in recent compounds.

### Annual Reports.

Delaware, Lackawanna & Western.—The annual report of the Delaware, Lackawanna & Western, for the calendar year, which has just been issued in pamphlet form, makes a remarkable exhibit. With gross earnings showing a decrease of \$843,000, or 3.84 per cent., the operating expenses of the railroad are reported as less by \$1,706,000, or 12.69 per cent., and net earnings increased by \$864,120, or nearly 10 per cent. Counting in the miscellaneous income, of which the most important item was \$904,173, earned by the coal department, which in 1898 reported a deficit of \$1,726,093, the balance in 1899 over fixed charges was \$4,843,000, equal to over 18 per cent. on the stock outstanding. This compares with a little over 5 per cent. in the previous year. This result means that the net income available for dividends increased by \$3,483,685, most of this amount being apparently due to savings in expenses of operation of the railroad and coal department. The figures for the year follow:

	1899.	1898.	Changes.
Earnings.			
Transp. of coal.....	\$9,407,796	\$9,902,666	D. \$494,870
Miscel. freight.....	6,300,149	6,105,655	I. 194,494
Passengers .....	3,951,051	3,501,708	I. 449,343
Mail .....	122,807	122,850	D. 43
Express .....	364,481	339,654	I. 24,827
Milk .....	482,139	505,884	D. 23,745
Miscel. sources.....	696,699	1,639,923	D. 993,229
Total earn.....	\$21,325,122	\$22,168,344	D. \$843,222
Expenses.			
Maint. way & struc.	\$1,881,131	\$1,896,632	D. \$15,501
Maint. equip.....	2,654,760	2,341,544	I. 313,216
Conduct. transp.....	6,870,584	8,895,033	D. 2,024,449
General expenses...	329,014	309,039	I. 19,975
Taxes .....	836,721	836,304	D. 417
Total expenses...	\$12,571,210	\$14,278,552	D. \$1,707,342
Net earnings.....	\$8,753,912	\$7,889,792	I. \$864,120
Misc. income.....			
Coal dept. earn.....	\$904,173	*\$1,726,093	I. \$2,630,266
Other income .....	577,181	602,132	D. 24,951
Total increase...	\$10,235,266	\$6,765,831	I. \$3,469,435
Fixed charges.....	5,391,989	5,406,239	D. 14,250
Balance .....	\$4,843,277	\$1,359,592	I. \$3,483,685
Dividends .....	1,834,000	1,834,000	.....
Surplus .....	\$3,009,277	*\$474,408	I. \$3,483,685
Advances to leased lines in previous year .....	479,222	.....	I. 479,222
Old acc'ts ch'g'd off .....	922,882	35,323	I. 887,554
Balance .....	\$1,607,173	*\$509,736	I. \$2,116,909
*Deficit.			

Such a statement of results is, of course, quite exceptional, and shows the working of the new leaven in the management of the company, introduced about a year ago by the election of Mr. Truesdale to the Presidency. Mr. Truesdale built up an entirely new operating organization. The changes in the staff which were made were not so much the displacement of old heads of departments, as the creation of new offices, the reassignment of duties, and the taking up of work which had previously not received much attention. With this organization completed, the new officers found that they had to introduce the



methods now recognized as essential in economical railroad working; but, making all allowances for deficiencies in the methods formerly employed, and recognizing the opportunities for far-reaching reforms and economies found in bringing the methods of doing business abreast of modern conditions, the results reported must still be regarded as extraordinary.

Such changes as were needed necessarily require time to show their full economy, and the present report covers less than a year of Mr. Truesdale's administration. Indeed, he explains in the report that a good deal of the seemingly heavy changes both in earnings and expenses are due largely to changes in bookkeeping. Thus, while the cost of conducting transportation shows a decrease of \$2,024,500 (23 per cent.), over \$1,040,000 of this is represented by doing away with a bookkeeping item for hire of equipment. This change represented the use of cars and engines on leased lines, which were without sufficient rolling stock of their own. Gross earnings were also credited each month with a corresponding bookkeeping entry. As the lines are leased in perpetuity, it has been considered unnecessary to continue these fictitious charges and credits. The large decrease in the miscellaneous earnings, shown above, is thus accounted for, as well as more than half of the apparent decrease in transportation cost.

Another change in the accounting which has had an important effect on the year's comparisons is the discontinuance of the practice of charging regular freight rates on coal used for engine supply or other company use. There has also been a charge to the coal department for transportation on coal mined or purchased by it, at rates made to the public, in accordance with published tariffs, instead of the old way of making an arbitrary charge of one cent per ton-mile. One result of this is that the ton-mile rate on coal has fallen from 1.062 cents to .946 cent in 1899. If the old practice had been followed, receipts from transportation of coal would have been larger by \$1,372,836 than shown by the actual figures. The decrease of \$494,500 reported in these receipts, and the loss in the rate, would have been difficult to understand because, like the other coal carrying companies, the Lackawanna's coal business was of large volume in 1899, the tons carried one mile increasing nearly 62½ millions, or 6.73 per cent.

Of the \$2,025,000 reduction reported in transportation service, \$1,608,000 is thus explained by accounting matters, \$1,041,100 in equipment hire, and \$566,800 in cost of locomotive fuel. Other savings in this account which are not thus explained are \$138,500 in train service and supplies, \$148,400 in station service, and \$107,600 in outside agencies, fast freight line and traffic association expenses. These accounts show that operating savings were beginning to show even in 1899, through the institution of improved methods, but in the nature of the case these economies can only slowly appear. President Truesdale anticipates "further and most gratifying results" when the changes in the methods of handling the transportation department have been fully inaugurated. It may be mentioned that tonnage rating of engines was introduced some time ago, and the conditions are such that large benefits are expected, but these began to appear only last month. The company purchased during the year 20 one hundred-ton freight locomotives, of which 15 were delivered; and built ten new engines at its own shops; and besides, has ordered 45 additional heavy engines. The large engines can only be used on certain divisions until the bridges have been strengthened.

The increases in transportation cost are not important in any item, and hardly significant, except that larger telegraph expenses indicate the more complete control of the movement of trains. An increase in the aggregate wages of engine and round-house men is interesting, in view of the commotion made in the public press at the time that the management changed the basis of computing trainmen's wages. These were formerly a fixed sum per month, with the Sunday suspension of traffic giving many of the men a weekly holiday. The wages schedule is now based on the mileage made. While under it the individual has received higher wages, the company gets better returns in the amount of work done for the same amount of money.

An account is given of special improvements at different points along the road, costing in the aggregate \$543,785, all of which was charged to operating expenses, as was also the cost of all new cars and engines purchased. This included, besides the 30 new locomotives referred to above, 15 new suburban coaches, five baggage and express cars and 60 freight cars. Equipment repairs were heavy, especially in the freight department, and \$250,000 was credited to renewal of coal cars. The company has disposed of most of its four-wheeled coal cars in previous years, and the replacement of these cars, which is so noticeable a feature in the recent operation of other coal lines, does not bother the new management. Roadway improvements were important last year, and will be carried on still more extensively this year, particularly in building new bridges. The problem of removing grade crossings confronts the company at a number of points, particularly Buffalo, Newark and Binghamton. Block signals are to be put in on the

divisions where travel is heaviest, and there is a long list of other improvements contemplated or under way.

Pennsylvania Railroad.—The annual report for the year to Dec. 31, issued this week, covers a length of 2,847 miles of railroad and canal, 25 miles more than in 1898. The earnings for the year make a remarkable showing and carry the totals considerably above the best previous record, the receipts of 1892 being now for the first time exceeded. This is material as to gross, above \$4,000,000, while in net the 1899 figures are about \$2,600,000 above those of 1892. As compared with 1898, the increase in gross is \$7,319,000, largely absorbed in increased expenses, so that the increase in net is \$1,485,000. These are the results on those Lines East of Pittsburgh and Erie which are operated directly. The results on the Western Lines are relatively the same, a large increase in gross revenue, pretty much all absorbed by larger operating expenses. For the entire system, including all the independent companies, the increase in total receipts is \$16,038,800, but in expenses it is also large, \$11,836,100, making the improvement in net earnings \$4,202,700. Increased charges and improvement appropriations take a good part of this additional income; and on all lines the addition to surplus is \$4,106,429, which is \$829,848 greater than the addition made in 1898. On the Pennsylvania Railroad proper the balance earned over charges of all descriptions, excluding the improvement appropriations of \$989,228, was \$10,041,000, equal to 7½ per cent. on the shares outstanding on Dec. 31 last, since which date the capital stock has been increased by 10 per cent. Dividends of five per cent. were paid (the rate established at the beginning of 1893), calling for \$6,465,266, but the balance carried over to surplus account was only slightly in excess of \$1,000,000, appropriations for improvements accounting for the balance of the net income, as will be seen by the following summary of the results of operations for the last three years on the Lines East of Pittsburgh and Erie, otherwise the three grand operating divisions, the main line, the United Railroads of New Jersey and the Philadelphia & Erie (cents omitted):

	1899.	1898.	1897.
Gross earn.....	\$72,922,984	\$65,603,737	\$64,223,173
Oper. exp.....	50,344,633	44,510,015	43,257,627
Net earn.....	\$22,578,351	\$21,093,722	\$20,965,546
P. c. exp.....	69	68	68
Other income.....	5,529,283	5,320,591	5,494,498
Total income.....	\$28,107,634	\$26,414,313	\$26,460,044
Charges.....	17,620,163	16,185,585	15,626,853
Net income.....	\$10,487,471	\$10,228,728	\$10,833,192
Sinking fund, etc.....	1,435,146	1,120,639	1,436,495
Balance.....	\$9,052,325	\$9,108,089	\$9,396,697
Dividends.....	6,465,266	6,465,236	6,465,170
Surplus.....	\$2,587,059	\$2,642,853	\$2,931,467
Extraordinary exp.....	1,500,000	1,800,000	1,800,000
Balance.....	\$1,087,059	\$842,853	\$1,081,467

It is of interest to note that the increase in gross earnings shown above is about equal to the loss in this item recorded in the 1894 report, the decrease then being \$7,700,000. The recovery in gross receipts since that year has been more than \$14,000,000. In net operating earnings the improvement has been only about \$4,300,000, figures which well illustrate the Pennsylvania policy of adjusting expenses to the revenue.

The results of operations on the lines operated by the Pennsylvania company, and by the P. C. C. & St. L. are separately stated, and are given below:

For the Pennsylvania Company proper:			
	1899.	1898.	Inc.
Gross earn.....	\$22,996,827	\$19,561,400	\$3,435,427
Oper. exp.....	15,939,211	13,465,352	2,473,859
Net earn.....	\$7,057,616	\$6,106,048	\$951,568
P. c. exp.....	69½	68½	
Other income.....	2,076,451	1,423,624	652,827
Total income.....	\$9,134,067	\$7,529,672	\$1,604,395
Charges.....	6,937,136	6,921,097	16,339
Net income.....	\$2,196,931	\$608,575	\$1,588,356
Extra exp.....	1,000,000	1,000,000	
Balance.....	\$1,196,931	\$608,575	\$588,356
Sinking fund, etc.....	1,091,401	213,718	\$877,683
Surplus.....	\$55,530	\$444,857	\$389,327

For the Pittsburgh, Cincinnati, Chicago & St. Louis.			
	1899.	1898.	Inc. or Dec.
Gross earn.....	\$21,196,816	\$18,942,651	\$2,254,165
Oper. exp.....	15,236,269	13,604,761	1,631,508
Net earn.....	\$5,960,547	\$5,337,890	\$622,657
Prop. exp. to gross.....	71½	71½	
Other income.....	115,684	69,385	46,299
Total income.....	\$6,076,231	\$5,407,275	\$668,956
Charges.....	3,623,465	3,630,744	7,279
Net.....	\$2,452,766	\$1,776,531	\$676,235
Extra expen.....	506,963	610,524	103,561
Balance.....	\$1,945,803	\$1,165,007	\$779,796
Dividend.....	738,998	340,244	\$398,754
Balance.....	\$1,206,805	\$824,763	\$382,042
Sundry charges.....	234,721	85,276	\$149,445
Prem. and bds.....	342,655	25,103	\$317,552
Surplus.....	\$574,429	\$715,384	\$140,955

In this year's report, last year's expenses are slightly altered to allow for a change in book-keeping, certain car-hire being now included in expenses.

For the whole system, earnings compare with 1898 as follows:

	1899.	1898.	1897.
Gross earn.....	\$152,169,106	\$136,130,271	\$136,038,835
Oper. exp.....	106,506,988	94,670,850	91,836,132
Net earn.....	\$45,662,118	\$41,459,415	\$44,202,703
P. c. exp.....	70	68½	
Other income.....	8,776,337	7,835,834	940,503
Total income.....	\$54,438,455	\$49,295,249	\$45,143,206
Charges.....	50,332,026	46,018,668	4,313,358
Surplus.....	\$4,106,429	\$3,276,581	\$329,848

These figures include all controlled and affiliated lines except the Terre Haute & Indianapolis and the Terre Haute & Peoria, which are in the hands of a receiver. The total length of all lines is 9,237 miles.

The deductions from the year's earnings for extraordinary improvements on all the lines were almost \$4,000,000. On the Eastern Lines, besides the special appropriation of \$1,500,000 set aside, in accordance with the policy of recent years, \$989,000 was deducted to carry on improvement work during 1899, and the several appropriations on the Western Lines foot up slightly over \$1,500,000. There were, however, some capital expenditures on the Eastern Lines, as noted in the President's remarks below; and there were capital expenditures on the Western Lines amounting to \$2,246,491. No important changes appear in the account of capital outstanding, the increased stock issued to shareholders at par being made after the close of the fiscal year. About \$2,000,000 of maturing car trusts were paid off, but new issues were created, to the aggregate of \$5,366,000, covering a total of 8,405 cars.

The statement of capital resources makes the usual unrivalled showing. The treasury on Dec. 31 held \$10,575,000 cash. The trust and sinking funds and the insurance fund amounted together to \$9,719,500. The cost of securities owned was \$120,398,926, besides the \$3,283,462 in securities received with the lease of the United New Jersey. The income from these investments was \$4,739,500, about four per cent. on their cost.

President Cassatt supplements the regular financial statement with notes concerning the more important doings of the company during the year. The Trust of Oct. 9, 1878, now amounts to \$9,792,300, the sum of \$91,438 having been added to it during the year. The assets of the insurance fund are \$4,345,512, an increase during the year of \$275,677. The charges to capital account during the year amounted to \$1,748,255, as follows:

Additional tracks.....	\$346,977
Real estate.....	372,478
Locomotives.....	675,800
Car Trust Equipment.....	350,000

The charge for additional tracks represents third and fourth main tracks between Altoona and Pittsburgh, including the practical completion of the four-track system over the Allegheny Mountain. The real estate bought was mainly land at terminal points. Work has been continued on improvement of the main line at Elizabethtown, Spruce Creek and Irwin and will be finished this year. The equipment of the New York Division with pneumatic automatic signals has been completed, and wharf improvements have been made at Brooklyn and Williamsburg, also at other places in New York Harbor and at Philadelphia. Most of the money required for improvements of this kind on the United Railroads of New Jersey, including the passenger station at Jersey City, improvements at Harsimus and Desbrosses street ferry and additional boats, was supplied out of the income of this division. There have been no charges to capital account on auxiliary lines except for real estate. The extraordinary expenditure on these lines was mainly in the construction of branches on the Cambria and Clearfield, Bald Eagle Valley, and South-West Pennsylvania Railroads, the extension of second track, yard tracks, and sidings on the Pittsburgh, Virginia & Charleston, and the improvement of the West Jersey & Seashore by inaugurating the work of stone ballasting the track of the Atlantic City Division and equipping it with pneumatic automatic signals.

During the present year considerable outlays will be necessary for third and fourth tracks, enlargement of terminals, more automatic signals and more cars and engines; for renewal of the bridge over the Susquehanna River at Rockville, rebuilding of the Pittsburgh passenger station, revision of line on the United Railroads of New Jersey Division, new passenger tracks at Hackensack, improvements of the Meadows yard and additions to floating equipment.

The freight tonnage east of Pittsburgh and Erie was 16 million tons greater than in 1898; and this increase is greater than the whole tonnage moved in 1875. The enormous business of this year could not have been done had not the company been prepared with costly third and fourth tracks, powerful engines and greatly increased freight car capacity. It may be expected that the business will increase in the future as in the past, as the iron industry of the country, being no longer restricted to the home market, is entering upon a new era. To keep in readiness for increased business the company will have to have additional capital, and this should be in the shape of stock rather than bonds. Under present authority only about eight millions more stock can



be issued; and in March, 1901, the stockholders will be asked to authorize an increase.

The average ton-mile rate fell to 4.73 mills, the lowest point ever reached. Railroad managers have not seen the constant reduction in rates without serious concern, but their strenuous efforts to check the downward movement have met with but little success. There is now no commercial necessity for the present low rates, but the downward tendency continues. At this point Mr. Cassatt says:

"Had the railway companies not been able to meet the diminution in the ton-mile rate by a corresponding reduction in expenses, disastrous results must have followed. But there is a limit, and it cannot be far off, to the possible lessening of the cost of movement. The only alternative is to arrest the reduction in revenue, which has been largely brought about by apparently uncontrollable conflicts between the railway companies, and between rival communities. It must be admitted that the situation is complicated. The problems involved in dealing with traffic questions covering so vast a territory, and affecting so many diversified interests, are troublesome and intricate, but they are not incapable of solution, and it is believed that by earnest and united effort the difficulties in the way may be met and overcome. With this end in view, and to establish closer relations between the managers of the trunk lines, it has seemed wise to your Board to acquire an interest in some of the railways reaching the seaboard, and to unite with the other shareholders who control those properties in supporting a conservative policy. This will, it is hoped, result in securing reasonable and stable rates and do away with unjust discriminations that are the inevitable results of the course that has heretofore been pursued. Aside from the indirect benefits thus sought to be gained, it is believed that these holdings will as investments be directly profitable."

The contract with the Pullman Palace Car Company has been renewed for 15 years, on more favorable terms than before. The two ferry companies between Philadelphia and Camden have been consolidated.

The number of depositors in the Employees' Saving Fund is 6,670, an increase of 1,127, and the amount of money in the Fund is \$2,717,709. The rate of interest paid to depositors will have to be reduced to 3½ per cent.

President Cassatt here gives the principal items from the report of the Voluntary Relief Department and recounts the action of the Directors in creating a pension department. These matters have already been given to the readers of the Railroad Gazette.

The report ends with notes of the veteran officers who have been retired on pensions and of President Thomson and Director Biddle, whose deaths occurred during the year.

#### January Accidents.

Our record of train accidents in January, given in this number, includes 108 collisions, 145 derailments and 9 other accidents, a total of 262 accidents, in which 31 persons were killed and 150 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.				
	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	15	0	0	15
Misplaced switch.....	2	0	4	6
Failure to give or observe signal.....	6	1	4	11
Mistake in giving or understanding orders.....	0	3	0	3
Miscellaneous.....	4	2	15	21
Unexplained.....	16	5	31	52
Total.....	43	11	54	108

DERAILMENTS.				
Broken rail.....	7	Derailing switch.....	2	
Loose or spread rail.....	4	Track repairs.....	1	
Defective bridge.....	1	Bad switching.....	4	
Defective switch.....	4	Bad loading.....	1	
Defective frog.....	4	Animals on track.....	2	
Broken wheel.....	15	Landslide.....	15	
Broken axle.....	14	Washout.....	1	
Broken truck.....	4	Malignant obstruction.....	2	
Fallen brakebeam.....	3	Unexplained.....	50	
Failure of drawbar.....	4			
Broken car.....	2			
Misplaced switch.....	5			
				145

OTHER ACCIDENTS.				
Boiler explosion.....	1			
Broken sidetrack.....	1			
Cars burned while running.....	3			
Various breakages of rolling stock.....	1			
Other causes.....	3			
				9

Total number of accidents..... 262

A general classification shows:

	Collisions.	Derailments.	Other accidents.	Total.	P. o.
Defects of road.....	0	0	20	20	7
Defects of equipment.....	15	42	3	60	23
Negligence in operating.....	41	13	4	58	23
Unforeseen obstructions.....	0	20	2	22	7
Unexplained.....	52	50	0	102	40
Total.....	108	145	9	262	100

The casualties may be divided as follows:

	Killed.	Collisions.	Derailments.	Other accidents.	Total.
Employees.....	13	6	3	22	
Passengers.....	3	0	0	3	
Others.....	6	0	0	6	
Total.....	22	6	3	31	
Injured.					
Employees.....	50	22	5	86	
Passengers.....	56	3	0	59	
Others.....	5	0	0	5	
Total.....	120	25	5	150	

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	3	0	2
Defects of equipment.....	0	0	0	5
Negligence in operating.....	3	56	17	65
Unforeseen obstructions and maliciousness.....	0	0	3	10
Unexplained.....	0	0	2	4
Total.....	3	59	22	86

Twenty accidents caused the death of one or more persons each, and 60 caused injury but not death, leaving 182 (69 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with January of the previous five years shows:

	1900.	1899.	1898.	1897.	1896.	1895.
Collisions.....	108	96	113	51	50	55
Derailments.....	145	94	130	68	78	67
Other accidents.....	9	7	14	7	5	7
Total accidents.....	262	197	257	126	133	129
Employees killed.....	22	40	39	26	40	23
Others killed.....	9	23	9	7	7	9
Employees injured.....	86	80	105	58	68	54
Others injured.....	64	96	75	42	51	46

Average per day:  
Accidents..... 8.45 6.35 8.29 4.06 4.29 4.16  
Killed..... 1.00 2.03 1.55 1.06 1.52 1.03  
Injured..... 4.84 5.68 5.80 3.23 3.84 3.93

Average per accident:  
Killed..... 0.12 0.32 0.18 0.26 0.35 0.24  
Injured..... 0.57 0.84 0.70 0.79 0.89 0.76

The feature of the present record is the small number of casualties due to derailments. The total number of accidents is large, as has been the case for several months past, and the reports of collisions are of the usual nature, but of the very large number of derailments only six were attended by fatalities, and, as will be seen by the tables, the whole number of casualties in this class was small.

The most disastrous accident in the record was the freight train collision at Ashley, Pa., on the 25th, the greater part of the damage being due to an explosion of dynamite in the front car of the train. This collision, as already noted in these columns, was due to the running away of a train of 45 freight cars on a long descending grade of about 96 ft. to the mile; and the train was in charge of a conductor who had run trains over this part of the road only four times. The worst passenger train accident was that at Lakeland, Fla., on the 21st. The other fatal passenger train accident was that at Waycross, Ga., on the 25th. The freight wreck at Chippewa Falls, Wis., on the 5th, in which 17 loaded cars were burned up, is reported as having been very costly.

The number of electric car accidents reported in our exchanges in January was 18, in which two persons were killed and 43 were injured.

The Trunk Line Association has issued its revised freight classification, to go into effect March 10, superseding classification No. 20, which has been in effect since January 1. The complaints of shippers concerning excessive differences between C. L. and L. C. L. rates appear to have been met chiefly by introducing what are substantially two new classes. A large number of articles which were in second class (L. C. L.) are now to go at 15 per cent. less than second class; and another large number which were in third class (L. C. L.) are to go at 20 per cent. less than third class. The articles now reduced are those which on January 1 were raised from third class to second or from fourth to third. In the first list we find agricultural implements of various kinds, bagging, candy, cotton warp, cotton piece goods, certain kinds of furniture in the white, various kinds of hardware, liquors in barrels and shade cloth. In the second list are various agricultural implements, ammonia, basket material, canned fruit and vegetables, car springs, coffee, crockery, many iron articles, glass, hides, many kinds of machinery, soap, tallow and sugar. Besides these there are about 25 other changes in classification, some of which are simply changes in minimum weights for carloads. Carriages, K. D., which were once-and-a-half class, and now 1½. Fish, salted, was L. C. L. 4 and C. L. 5; it is now L. C. L. 4 and C. L. 6. Street cars C. L. were 11,000 lbs. first class; now 20,000 lbs. fourth class. Drygoods, etc., packed in boxes made of strawboard and similar material, are 10 per cent. higher than the regular tariff, instead of one class higher. Chairman Gill says that in a general way this compromise on the second-class and third-class articles has the effect of taking off about two-thirds of the increase in rate which was produced by the change of January 1. Car-load rates on these articles remain unchanged. The railroads have "split the difference" with the shippers and have given them much the larger half.

#### Foreign Railroad Notes.

A bill has been introduced in the English Parliament empowering the Board of Trade, under certain restrictions, to enforce the changes in railroad practice recently recommended by the Royal Commission which investigated casualties to railroad employees. Among these recommendations are: The equipment of freight wagons with brake levers on both sides, the better lighting of yards where switching is done at night, the covering of signal wires so that men shall not stumble over them, the use of brake vans on all freight trains moved on the main track, and the protection of track repairmen when at work. A bill has also been introduced increasing the powers of the Board of Trade and the Railway and Canal Commission in the direction of ordering cheap suburban workmen's trains to and from London.

The pension office of the Prussian State Railroad is about to establish a sanitarium for employees suffering from pulmonary complaints. It is to be near some railroad center, where it can be reached from the remotest stations in a single day. This sanitarium is to have accommodations for a hundred patients; but the establishment of a second in the eastern part of the kingdom is already contemplated.

Hungary now enters the list of pig iron exporting countries, having heretofore imported. The output of its blast furnaces has so increased of late, however, that they have been unable to market all their product at home; and they have persuaded the State Railroad management to carry what they export at a reduced rate, estimated to cover only the bare cost of hauling.

The Prussian State Railroads propose to send a number of delegates, mostly engineers, to the Paris World's Fair, all of whom will be required to present a written report. An appropriation of \$3,100 is asked for this purpose, estimating an allowance of \$108 per delegate, traveling being free for them.

#### Storage Battery Cars on Standard Gage Railroads in Germany.

To satisfy the demand of the public for more frequent trains, the management of the "Palatinate" railroads (German) in 1896, put on several independently driven cars, which either alone or with trailing cars were to be run between the regular trains, and thus unite the principal suburban stations with those where express trains stop.

Encouraged by the good results which were obtained with storage batteries, on the narrow gage Ludwigshafen Hundenheim Railroad, the management decided to equip the lines from Ludwigshafen to Worms in one direction and Ludwigshafen to Neustadt in the other direction, with motor cars driven by electric power. One of the reasons for this was because there were in Ludwigshafen and in Neustadt already established electric lighting installations, from which the necessary current could be obtained.

The experimental cars have been in regular and uninterrupted service for passenger traffic since Jan.,uary, 1897. For these experiments four ordinary third-class cars with five and six compartments were chosen. In the cars with five compartments, one of the end compartments was taken for the controlling apparatus and the other necessary machinery, and in cars with six compartments both ends were used for the controllers in order to avoid turning the car around. Windows were put into the ends of these compartments to enable the motorman to see the track ahead.

The storage batteries are put under the seats and are charged without removal from the car. Each car is provided with two motors, which are so arranged that they can be used in series when starting, but when a speed of about 25 km. (15½ miles) is reached they can be connected in parallel. Besides these customary arrangements, it was found very desirable to arrange the apparatus with adjustments for the normal velocity of 45 km. (28 miles) and for other velocities of 48 km. (29¾ miles) and 52 km. (32¼ miles) an hour to provide against loss of time on the journey. The controller and other apparatus used in the actual operation of running the trains are similar to those used on street railroads.

In the first two experimental cars the available space was made into one large battery box in which were put about 30 cells. With 2.2 volts as the average the electromotive force was 66 volts for the 30 cells. In spite of the very careful installation, so much leakage occurred that the results were not satisfactory. In the later cars, therefore, the space was divided so that in one case 16 and in the other only eight cells are placed in the same compartment. A very marked improvement has resulted. The life of the batteries has not been affected by the motion of the car. The side shocks which were received in the shifting at the stations, however, caused many broken connections between the plates; so that af-



terward the cells were placed with the plane of the plates perpendicular to the direction of the train and no trouble from this cause has since been experienced.

At first, trouble was feared from the hydrogen gas set free in charging the batteries, which it was thought might find its way into the cars. A device was provided whereby the gas should be drawn out of the space where the cells are, but it has not been found necessary, and, although the cells are entirely open, no trouble has been found by the slopping over of the solution.

The batteries are charged at the terminal stations at Ludwigshafen and Neustadt, and it takes from 30 to 40 minutes. The batteries have a capacity of 200 ampere hours and last for a journey from Ludwigshafen to Neustadt, 30 km. (18.6 miles), or for the trip from Ludwigshafen to Worms and return. The energy required on a straight line and level grade was found after repeated trials to be about 18 watt hours per train kilometer. At the time of a strong side wind, a consumption of 27 watt hours (an increase of 50 per cent.) was observed.

The positive plates have now run 30,000 km. (18,630 miles), but it appears that they will last for at least 60,000 km. (37,260) miles. The negative plates, however, while not destroyed, show some signs of wear after 30,000 km., and it was thought best to renew them.

This renewal is made by removing the old material from the foundation-plate and replacing it with new material. This has been done during the spare time of the employees who take care of the batteries. The renewal of the negative plates is done gradually while the train is waiting at the end stations.

The weight of the motor trains is as follows: Empty passenger cars, 11.0 tons; batteries, 9.3 tons; motors and apparatus, 4.1 tons; or total of 24.4 (long) tons, of which 13.4 tons belong to the motor and apparatus. The trailing car weighs about 10 tons, hence the whole train weighs, empty, about 24.4 tons, and when fully loaded about 40 tons. The cost of operation is about 4.9 cents per train kilometer. The price for charging the batteries is placed at 2.4 cents per kilowatt hour, a price for which it can be produced in most electric light stations. The cost of maintenance can be reckoned about 2.4 cents per train kilometer.

These motor trains run at a speed of from 40 to 45 km. (25 to 28 miles) an hour, and each has one engineer and one guard. Of late, the conductor has taken his place in the motorman's compartment after the examination of the tickets, and is sufficiently well instructed in the management of the apparatus that in case of emergency he can run the train. In other respects these motor trains are arranged and managed like other trains. The electric trains are much preferred by the public, being free from smoke, cinders and noise.

From the results of these trials, extending now almost three years, the management has decided to put on more of these trains, which will have some improvement over those in use, and are expected to be materially cheaper to operate. The new trains will contain places for 106 passengers and will be run without trailing cars. Inasmuch as the number of railroads which have electric lighting plants of their own is constantly increasing, there are many companies which could use motor cars with storage batteries for service on lines where the travel is light.

#### More Newspaper "Enterprise."

In recent issues, namely, Oct. 20, page, 732, and Jan. 12, page 26, we called attention to an ancient scheme for preying upon the public which is now being worked with considerable activity by certain newspapers which have a certain air of respectability. The cases noticed were those of attempts to sell greater or less quantities of a so-called "trade paper" by writing up locomotive works and car coupler works. We have now received from certain engineers still a different kind of "writeup," a few particulars of which are worth publishing in the hope of preventing some gentlemen from falling into the trap.

The Southern Review of Commerce, published in Louisville, Ky., sends a draft of a manuscript for an editorial to be published shortly in that paper. In this editorial the name of some engineer is mentioned, and the letter accompanying the manuscript states that the article will be published "strictly editorially" and that copies of the issue of the Review of Commerce containing this editorial can be had at various prices, running down to eight cents in lots of 1,000; also, that a year's subscription is given with an order for 100 copies.

The so-called editorial article informs the readers of the Review that it has established a bureau of information for the purpose of getting accurate information "through research and exhaustive investigation" in regard to engineers, among other things. Through that bureau it has been learned that the consulting engineer mentioned in this article "is the best equipped, through scientific attainments, ripe experience and high professional standing to give best satisfaction in . . ." The reader is informed

that the sources of information were varied, "the ramifications of our data extending in every direction, and we publish in our editorial columns, for the sole benefit of our readers, the unsolicited endorsement which follows. We found that . . . is, without doubt, a most thoroughly reliable consulting engineer, being scientific and accurate, etc. . . . We disclaim any desire to advertise the above-named gentleman and most positively assert that this editorial is the expression of a conviction born of the acquisition of facts, and we advise our inquirers to communicate direct with . . ." It is only just to say that the distinguished editor of the Southern Review of Commerce is Mr. R. Franklin Starr.

#### TECHNICAL.

##### Manufacturing and Business.

The International Pneumatic Railway Signal Co. was incorporated in West Virginia Feb. 27, with an authorized capital of \$625,000. It is an auxiliary company of the Pneumatic Ry. Signal Co. of Rochester, N. Y., and is formed for the purpose of exploiting the company's devices in Europe. The incorporators, all of Rochester, N. Y., are: George W. Archer, Albert H. Harris, George Weldon, Thomas A. Smith and George C. Potts.

At the annual meeting of the Boston & Lockport Block Co., held at the office of the company at Lockport, N. Y., the following were elected directors: A. D. Bosson, Frank Gebble, Mrs. Adelaide C. Beverly and Myron H. Tarbox. The following were elected officers: A. D. Bosson, President; Frank Gebble, Vice-President; Myron H. Tarbox, Secretary and Treasurer; Alfred B. Tarbox, Assistant Secretary. The Executive Committee is composed of A. D. Bosson, Frank Gebble and M. H. Tarbox.

A new reversible air drill will soon be placed on the market by the Chicago Pneumatic Tool Co. This machine is adaptable to drilling, reaming, tapping, flue rolling, stay bolt and other classes of work. The operating part runs entirely in oil. J. F. Duntley, who is making an extensive trip to the Pacific Coast and the Western States in the interest of this company, of which he is First Vice-President, reports that the interest taken in pneumatic goods is far beyond his expectations.

Leach & Simpson, representatives of the Corning Brake Shoe Co. and the U. S. Bronze Co., have moved their offices from 745 Old Colony Building, Chicago, to rooms Nos. 1630-1636 of the same building.

One coach in each of four passenger trains of the Canadian Pacific have been fitted with automatic apparatus for controlling the temperature in the cars. This apparatus was furnished by the Powers Regulator Co., Chicago.

##### Iron and Steel.

George A. Evans, late representative of the Bethlehem Iron Co., died on March 6, at the age of 67.

The Carnegie Steel Co., in addition to building fourteen 50-ton basic open-hearth furnaces and a new blooming mill at the Duquesne Steel Works, will build a small continuous billet mill at these works capable of rolling down to 1½ in. from the ingot.

The property of the Central Iron Works in Herr St., Harrisburg, Pa., has been sold to J. E. Wilson of Philadelphia. It is believed that the works will be dismantled.

Fire during the evening of March 3 destroyed the anvil foundry of Hay, Budden & Co., in North Henry St., Brooklyn, N. Y., causing a loss estimated at \$185,000.

The Tube Steel Co. has been incorporated in West Virginia, with a capital of \$5,000,000, to make open-hearth steel and tubular products of iron and steel. It is also empowered to own railroads. The incorporators are: James N. Vance, John D. Culbertson and Frank J. Hearne, of Wheeling, W. Va.

The Cambria Steel Co. has bought the Great Bluff coke ovens at Dunbar, Pa., which have been idle for three years.

All the coke operators in the Connellsville region, led by the H. C. Frick Coke Co., on March 1 made an advance of 12½ per cent. in the wages of all employees.

##### Interlocking.

The Standard Railroad Signal Co. has taken a contract to put in interlocking switches and signals for the Delaware & Hudson at Ballston and Waterford, N. Y.

##### Electric Railroads in Germany.

According to a report recently printed in *Elektrotechnische Zeitschrift*, there has been a large increase of electric railroad installations in Germany during the year ending Sept. 1 last. At that time there were 89 power stations supplying electric lines, an increase of 31 per cent. over the previous year. The aggregate length of the electric lines in that country shows an increase of 45 per cent., and the available power has increased 57 per cent. during the same period. The storage batteries now used in the power stations aggregate an output of 13,502 kw., which is about one-fourth of the dynamo power output of these stations. There are very few

roads where storage batteries are used on the cars, their use being confined mostly to the power stations to take the peak of the load. There were in September but 1,274 miles of track of electric roads in Germany. The report says that the gas tram line at Dessau, which has generally been thought successful, will adopt electricity.

##### The Reading Locomotive Shops.

The contract for the locomotive shop of the Philadelphia & Reading in Reading, Pa., has been let to Ryan & Kelley of Philadelphia, for about \$400,000. About 100,000 cu. yds. of earth will have to be removed. The plans for the balance of the plant are being made by Wilson Bros. & Co. of Philadelphia. The other buildings will be built as desired.

##### New Bridge Building Works.

The Alabama Bridge Co., with office at Decatur, was recently organized under the laws of Alabama with a capital stock of \$300,000, fully paid in. The incorporators are mainly stockholders of the Groton Bridge & Mfg. Co., of Groton, N. Y. The work, we are told, will be very large. The plant is located on the Tennessee River, which is navigable the year round and is in the center of the iron and steel business of the South. The shops will be in operation May 1. Wm. T. Young, of Nashville, Tenn., is Manager.

There was a company recently organized under the laws of Texas, known as the National Bridge Co., with a capital stock of \$200,000. The plant now building at Fort Worth is nearly completed and will be in operation in about two weeks. The main office and works of the National Bridge Co. is Fort Worth, Tex. M. S. Hasie is Manager.

##### Work at the Grand Trunk Shops.

During the past year the Grand Trunk has materially improved its rolling stock. At the Point St. Charles shops two fine café-parlor cars have been built, and seven first-class coaches and two combination baggage cars. At the Montreal shops 230 box cars, 200 flat cars, 153 coal cars and 50 cinder cars have been built, and two new dining cars were provided for the Middle Division. In connection with the repair work 3,240 freight cars have been equipped with M. C. B. automatic couplers and Westinghouse air brakes; and wide vestibules have been put on all recent passenger equipment. There have also been built at Point St. Charles six ten-wheel passenger locomotives, six eight-wheel mogul freight locomotives and ten engines of various types. In addition ten compound consolidation locomotives were bought of the Baldwin Locomotive Works, and 24 mogul locomotives are now building in the company's works.

##### The Waterloo and City Tunnels.

In addition to the motor troubles on this line, the engineering staff have had to devote unceasing attention to water leakage into the tunnels ever since the railroad started working. The water does not come from the river Thames, under which the line is laid, but from the water-bearing gravel soil. The pumping arrangements have only been of a temporary character so far, although they have been continuously in use. It has now been decided to install a set of permanent electric pumping machinery, and it is thought that the difficulty in dealing with the leakage will be overcome.

##### Metal Cross Ties.

Though not much has been said recently of the use of metal cross-ties in Germany, where for many years there have been some thousands of miles of track laid with them, they continue to be used on a large scale. The estimates of the Prussian State Railroads for the year beginning with April 1 announce that out of 1,112 miles of track to be wholly renewed during the year, 433 miles are to be laid with iron ties. The wooden ties will cost on the average \$1.07 each; the iron ones \$24 per ton.

##### The M. C. B. Association—Subjects.

The Committee on Subjects of the Master Car Builders' Association has sent out a circular asking members to submit any subjects which it is thought should be investigated by committee during the coming year; also subjects for five-minute topical discussions at the convention. The Chairman is Mr. G. L. Potter, General Superintendent of Motive Power, Pennsylvania Lines West, Pittsburgh, Pa. The other members are Mr. A. M. Waitt and Mr. A. E. Mitchell. Answers to the circulars should be sent in not later than May 1.

##### Wheel Circumference Measure.

The Committee of the Master Car Builders' Association on Design for Wheel Circumference Measure asks suggestions as to changes which should be made in the present standard design. Answers should be sent to Mr. J. J. Hennessy, M. C. B., Chicago, Milwaukee & St. Paul Ry., West Milwaukee, Wis.

#### THE SCRAP HEAP.

##### Notes.

The Ohio Legislature has extended until June 1 the time within which railroad companies may equip their cars with automatic couplers.



The Atchison, Topeka & Santa Fe is preparing all of its engines used in California to burn oil fuel. This includes the engines of the Southern California and the San Francisco & San Joaquin Valley.

The Pennsylvania Railroad Company has assumed direct control of the restaurants and lunchrooms in the company's stations at Jersey City, Baltimore and Washington. They will be run under the management of Mr. J. T. Trout, Superintendent of the dining car service.

Serious damage was done by floods in New England at many places last week. On the Northampton Division of the New York, New Haven & Hartford a passenger train was wrecked, near Plainville. On Tuesday of this week the car ferries at Detroit were much delayed by ice and some of the boats, bearing passenger trains, were held in the middle of the river for several hours.

The Wabash road has issued a circular announcing slight advances in the wages of enginemen and firemen. It does not appear from the published accounts whether all of the men on the road are affected, or if not, what divisions the order applies to. Certain passenger enginemen have their pay increased from \$3.35 per 100 miles to \$3.40. Freight conductors and brakemen receive increases of 10 cents and five cents per 100 miles. Advances at about the same rates are granted to freight enginemen and firemen and to men on switching engines at a number of important stations. The Chicago, Rock Island & Pacific has increased the pay of passenger brakemen on certain branch lines from \$45 a month to \$47.50, and a similar advance is granted to brakemen on work trains. The request of switchmen at certain cities to have their pay put on a parity with the rate at Chicago has been denied. The Central of New Jersey has dispensed with the services of brakemen (flagmen) on helping engines used on mountain grades; and on certain freight trains the number of brakemen has been reduced from two to one.

#### Milwaukee Street Railway Franchise Decision.

In the case of the injunction granted by the Superior Court of Milwaukee County the Supreme Court of Wisconsin has decided that a court of equity has not the right to enjoin a legislative body. This decision quashes the contempt proceedings against the city officials. The decision holds that the Legislature has the authority to delegate to municipalities power to grant corporate rights and franchises; that the City Council is a legislative body, and that the courts have no right to interfere with such a body, the corporate rights and franchises granted by it having the force and effect of a statute of the State. The ordinance was described in this column on Jan. 12, p. 25, and Jan. 26, p. 60.

#### British Trolley Lines.

The electric street tramways of Bristol and Dublin have now arrived at the stage when the advantages of electrical working are showing themselves in largely increased traffic receipts and diminished working expenses. The Dublin lines now consist of 42 miles electric and 2 miles horse (these are now changing over to electric). The Bristol system will all be working electrically by the summer months this year. The financial results of the two tramway companies for the year 1899 have been so satisfactory that in each of them shareholders have received an additional 1 per cent. dividend. The large new power station at Ringsend, for the Dublin service, is now in working order. The Bristol power house is nearly finished, and it will be ready for the complete electrical service in the summer. At both of these new power stations the work of American contractors is very strongly in evidence. Most of the steel structural and chimney work, as well as the electrical equipment, are of American manufacture.

#### A Gothard Railroad.

A very general false impression of the profitability of the Gothard Railroad prevails because it pays good dividends on its shares. It is generally forgotten that of the 272½ millions of francs invested in that property no less than 119 millions consists of subsidies which bear no interest, made by the three countries chiefly interested. On the whole capital expended on the work the earnings last year were only 2½ per cent., though the holders of the 50 million (francs) stock got 6 per cent. This is precisely like the case of the Union Pacific Railroad, which for a time paid 8 per cent. on its stock, while the government was paying the interest on about half of its bonded debt.

#### The Machinists' Strike in Chicago.

The strike of Chicago machinists for recognition for their union has involved a large number of manufacturers, and at this writing it is said that about 4,000 of the 7,000 machinists in that city are out. Non-union men are being employed at a number of shops, and measures have been taken to protect them. The employers have also formed an organization under the name of the Chicago Association of Machinery Men. P. W. Gates, of the Gates Iron Works, is President. This Committee has held some conferences with the machinists' union, but it now seems probable that the difficulties will not be settled for some time.

#### New York Public Works.

Bids were opened Feb. 28 and contracts let by the Dock Commissioners of New York City, for building a new wooden pier with appurtenances near Coenties Slip, East River, and for dredging north of West Thirty-fourth St., North River. The bids for the pier were as follows: Augustus Walsh, \$49,000; Wm. T. Ritch, \$48,997; Wm. H. Jenks, \$49,344; Bernard Rolf, \$45,433, to whom the contract was awarded, and Henry L. Spearin, \$46,877. The bids and bidders for dredging were Edw. S. Walsh, 15 cents per cu. yd.; Jas. R. Steers, 14.8 cents; P. Sanford Ross, 12½ cents; W. H. Beard Dredging Co., 12.4 cents, who received the contract, and Morris & Cumming Dredging Co., 20 cents.

#### Railroad Socialists in Germany.

There is a society called the "German Railroaders' Union," which professes socialist principles and is regarded by the Prussian Government as having a revolutionary tendency. Hand bills inviting employees to attend a public meeting of this society having been distributed around the railroad shops in Berlin, the State Railroad authorities there gave notice to their officials to keep a sharp eye on the proceedings of this union and the conduct of their subordinates in relation thereto, and execute strictly the orders concerning it. The subordinate employees are warned that they are forbidden to join this union or give any support to its efforts, such as circulating its newspaper organ or invitations to its meetings, on pain of immediate dismissal from the service. Attendance on such meetings will cause them to be suspected of belonging to the union or supporting its objects.

#### The British Honduras Railroad.

Since the publication of the consular report on the proposed railroad in British Honduras, the proposal there quoted as accepted by the council has been withdrawn by the other party to the contract. Though there is strong opposition to any railroad in the colony, it is certain the present government intends to build one. When the railway is actually begun, a concession will be granted by Guatemala on most moderate terms for its extension into the province of Peten, and from there the system can connect with the Mexican railroads that are proposed for the State of Yucatan. Guatemala needs an outlet for the vast wooded country adjacent to that colony, and to the north the Government of Mexico is assuming control over that portion of Yucatan which has been and is now in possession of the Santa Cruz Indians. Men and munitions of war are being forwarded to the frontier of Yucatan and British Honduras, and, either peaceably or by force, Mexico intends to establish civil authority in all that State. Then the natural outlet to the sea would be by way of the port of Belize. The U. S. Consul would be glad to forward the report of the Sheldford survey to any railroad builders of the United States.

#### The Gokteik Gorge Viaduct, Burmah.

A letter received in Harrisburg, Pa., from one of the men sent to India to erect the new big steel viaduct over Gokteik Gorge for the Burmah Railway, states that practically no iron was raised until Jan. 1. The men work from 7 to 12 and from 2 to 6. The writer says: "The comfortable quarters that were to be built by the railroad ready for our occupancy will perhaps be completed when we have finished the bridge, but certainly not before. All the bungalows we are using were built by our own men after they arrived. All our workmen, with the exception of 25, are natives of India, away from the north; big, tall, handsome fellows, but not very strong. The natives of Burmah and the Shavns states are not mechanics and the only ones we employ are wood choppers in the jungle, supplying fuel for our hoisting engines."

This viaduct is being built by the Pennsylvania Steel Co. across the Gokteik Gorge, 70 miles from Rangoon, Burmah. It will be 2,300 ft. long and 320 ft. high at its highest point. In addition to the structural material, a plant including an air compressor and other modern machinery for doing the work, were sent from the United States.

#### Three New Railroads in Roumania.

Mr. I. I. Bratani, Minister of Public Works for Roumania, Bucharest, has approved of plans for three new railroad lines to be built in the immediate future at a cost, exclusive of rolling stock, of \$16,546,100.

#### South American Notes.

The increase in copper production in Peru has revived the plan for the extension of the Central Railroad from Oroya to Cerro de Pasco, 65 miles, which it is estimated will cost \$2,500,000. This work should properly be done by the Peruvian Corporation and steps are said to be making toward a reorganization of the company, providing definitely, among other things, for the speedy building of this road.

The operation of the famous Huanchaca silver mines in Bolivia has for some months past been in the hands of the Messrs. Gugenheim of New York. As managers of these works they will also control the administration of the Autofagasta & Bolivia RR.

A special charter has been granted by the Chilean congress to Javier Arlegui Rodriguez and Valentin Lambert for building a line of railroad from Pumo station on the Southern RR. to Las Cabras. Plans are to be submitted for approval within six months.

The increase of commerce at Manaus, Brazil, 1,000 miles up the Amazon from its mouth, has been so great that the state of Amazonas is asking for tenders for the improvement of the port, including a new breakwater, docks and all requisites for loading and discharging cargo, as well as enlargement of the government warehouses.

The electric railroad through the city of Manaus, with extensions to suburban points, is now 15 miles long, with an additional seven miles under construction. This is owned by Mr. Chas. R. Flint of New York, who also controls the telephone system, and other important enterprises in this progressive center. It is also reported that Mr. Flint will erect at Manaus one of the finest hotels in South America.

Sir Walter J. Sendall, Governor of British Guiana at Georgetown, has ordered a survey of the district south of the Colony from the Berbice River to Dutch Guiana, to provide water supply and to build a railroad at a cost of about \$500,000.

The Argentine Government has granted a concession to Messrs. Peacock & Co. for building and working light railroads in that Province. The line will run from Cruz Alta through Las Canas and other cities to Rio Seco, about 400 miles, with several branches. Work is to be begun within six months from the date of the contract and the first section opened within two years. The company may be addressed care of the Minister of Public Works at Cordoba.

Messrs. Hopkins, Gardom & Tetley, engineers of Calle 25 de Mayo 130, Buenos Aires, Argentina, have obtained the contract for completing the Transandine Railroad. On the Argentine side of the Andes there are 15½ miles to be built, and on the Chilean side about 21 miles, most of which is through the mountains.

#### Traffic Notes.

Eastbound shipments from Chicago for the week ending March 1 amounted to 169,012 tons, for the week next preceding 154,670, and for the week before that 212,312 tons.

Kansas newspapers report that the Atchison, Topeka & Santa Fe will this week give to 200 millers and grain dealers of that State an excursion to Galveston, with a view to letting these merchants see the advantages of that city as an exporting point for grain and flour.

It is said that the disturbances in Trunk Line passenger rates have been settled, the Lake Shore & Michigan Southern and the Michigan Central having agreed to discontinue accepting from their Western connections the low proportions which have been objected to by all the other lines. From March 15 these two roads will accept no differential rates.

The presidents of the Trunk Lines and their Western connections have reduced the rates on grain from the West to the Atlantic Seaboard seven cents and 4½ cents on export and domestic shipments, respectively. The new rates went into effect March 5 and are on the following basis (per 100 pounds):

	Domestic.	Export
Chicago to New York .....	15	13
Chicago to Philadelphia .....	13	12
Chicago to Baltimore .....	12	11½
Mississippi River to New York .....	17½	13
Mississippi River to Philadelphia .....	15½	12
Mississippi River to Baltimore .....	14½	11½

It is doubted whether the new tariff will have much effect, as it is said there are many large contracts in force which provide for rates much lower than those here given.

#### Commission Decision on Commutation Fares Between Baltimore and Washington.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has rendered its decision in the case of Sprigg and others, representing commutation ticket holders between Baltimore and Washington against the Baltimore & Ohio and Baltimore & Potomac railroads. The complaint arose in consequence of the withdrawal from sale of 180-trip commutation tickets between Baltimore and Washington, compelling the commuters to buy 60-trip tickets. The Commission decides that the withdrawal of the 180-trip ticket did not constitute a violation of the Act to regulate commerce. Under the Act, carriers are allowed to issue mileage, excursion and commutation tickets, but ordinarily they cannot be compelled to do so. To the extent necessary for their use, tickets of the description named are exempt from the general rules of the statute. Compliance with those rules may be directed by the Commission, but requiring exceptions thereto is not within its province; and this applies as well to the restoration of such tickets where they have been withdrawn as to the refusal to furnish them where their introduction has been requested.

Section 22 authorizes special rates to commuters which are less per mile than the charges to other passengers for longer distances. Such a relation of rates must exist at certain points under any system of commutation. The most remote point within a commutation district secures lower rates per mile than the next and most distant point without that district; but the discrimination thus created is not unjust nor are places outside the commutation territory thereby subjected to undue prejudice.

The Commission has no authority to administer the anti-trust law or even to determine whether it has been violated. If an investigation discloses a violation of that law, the power of the Commission is not enlarged nor its duty changed in respect of the rate involved in the inquiry. No relief could be afforded the complainants in this proceeding upon the theory that the quarterly ticket was withdrawn under an agreement between the carriers in violation of the anti-trust law, even if the facts were found in support of that contention.

Commissioner Clements filed a dissenting opinion.

#### The Burmah-Chinese Railway.

The concession for a railroad through Western China, granted to the British Government, will be transferred to the Yunnan Company, which has made surveys of the route. The route is now proposed to run from Kunlon Ferry, on the Burmah frontier, to Chengtu, the capital of Szechuan, on the Min River. On part of the route, construction will be difficult and expensive and on some sections it is doubted if the railroad will pay at the outset. The surveying corps of the Yunnan Company is headed by Capt. Davies, of the Oxfordshire Light Infantry, and Lieut. Watt-Jones, R. E. The Chengtu-Chungking section runs through a very thickly peopled and prosperous region and will probably be the best paying part of the undertaking.

#### Increase of Railroad Stock in Sweden.

The authorities of the Swedish Railroad System have applied to the Government for a grant of 5,000,000 kroners (\$1,340,000) to increase the rolling stock. Mr. T. Nordstrom, General Director of the System, and F. A. Almgren is Director of Rolling Stock and Materials, both at Stockholm.

#### Chicago River and the Canal.

On Feb. 16 the steamer Jesse Spalding, loaded with 70,000 bushels of corn, on leaving a slip in charge of two tugs blocked the Chicago River from 2 p. m. until 8 a. m. next day. The bow of the steamer was caught by the current, estimated at from 1½ to 2½ miles an hour, and swung around. The steamer is over 200 ft. long and draws 15 ft., and made an effective dam. Four tugs tried to release her without other effect than to break the tow lines. The flow through the Drainage Canal was 285,000 cu. ft. a minute over the dam at Lockport, and 85,000 cu. ft. through the Illinois & Michigan Canal at Bridgeport. The Drainage Board telegraphed to Lockport and raised the dam to check the current, the effect of which was not felt in the river for several hours.

Feb. 23 the steamer Amazonas of Duluth, loaded with corn, blocked the river and swung against the Fort Wayne bridge near Eighteenth St., delaying trains on that road and the Chicago & Alton for several hours until they could get out of the city by a roundabout way, as the blockade continued from 1 p. m. until the next day and necessitated closing the controlling works at Lockport.

#### New York City Tunnel Railroads.

A hearing will be given on Friday, March 9, by the Municipal Assembly of New York City, on the application for a franchise by the New York & Brooklyn Transportation Co., which wants a franchise to build



a tunnel railroad under certain streets of Manhattan Borough, and under the East River to Brooklyn. The route is as follows:

Commencing at a point under Canal St., Manhattan, at or near to the junction of Sullivan, Varick and Canal streets, thence under Canal, Watts, West and Vestry streets to Grand St. and under the East River to Broadway, Brooklyn, under it, Wythe Ave., South Eighth St. and Kent Ave., Borough of Brooklyn. Branch tunnels go under Rutgers St. and Rutgers Slip, Manhattan, to the East River, under it and Adams St., Brooklyn, to High St., and the Plaza to Sands St., Brooklyn.

The Terminal Railroad & Tunnel Co. has also an application before the Municipal Assembly for a tunnel railroad from at or about the intersection of Lincoln Pl. and Flatbush Ave., Brooklyn, and under Flatbush Ave., with a loop under the plaza of Prospect Park; to Pacific St., thence to a point at or near the station of the New York & Brooklyn Bridge, to and under the East River to South St., in the vicinity of James Slip, Manhattan, and thence to New Chambers St.; such point in the vicinity of Dewey Ave. and Center St., as may be determined, with a branch route beginning at the intersection of New Chambers St. and Park Row, to West St. and under the Hudson River to New Jersey.

#### The Journey Across Siberia.

Mr. R. Nagelsmackers, Acting General Manager, and Mr. O. Roditi, Engineer, of the International Sleeping Car Co. (Europe), have recently arrived at San Francisco from Asia; and, according to an interview in the San Francisco Chronicle, these gentlemen report that within a month or two the journey across Siberia can be made wholly by railroad and steamboat. As our readers already know, the Siberian Railroad is in operation from the Russian frontier eastward to Irkutsk, near Lake Balkal, about 3,000 miles from St. Petersburg. The trip across the lake, about 40 miles, is made by steamboat, and a car ferry, which will be powerful enough to break ice and thus prolong the season of navigation, will be put on. From the east side of the lake to Stretynsk, on the Amoor River, the distance is about 600 miles, and, according to Mr. Nagelsmackers, this stretch of road will be finished in April. From Stretynsk steamers will take passengers down the Amoor River to Khabarovska, near the Pacific Coast, whence the trip can be finished to Vladivostok, 600 miles to the south, over the railroad which has been for some time in operation.

#### LOCOMOTIVE BUILDING.

The Central Vermont is said to be considering a few new locomotives.

The Pennsylvania, it is rumored, has ordered 48 engines from Baldwin Locomotive Works.

The Ann Arbor has decided not to order at present the locomotives recently under consideration.

The Indiana, Illinois & Iowa is reported to be considering ordering six more locomotives.

The Atchison, Topeka & Santa Fe, it is rumored, is again considering ordering some engines.

The Union Pacific, it is reported, has ordered 50 four cylinder compound engines from Baldwin Locomotive Works.

The Lake Shore & Michigan Southern is about ordering 25 consolidation engines and 10 ten-wheel passenger engines.

The Louisville & Nashville, we are informed, has ordered 10 consolidation locomotives from the Cooke Locomotive Works.

The Chicago Great Western has ordered from the Baldwin Locomotive Works the 10 consolidation locomotives noted Feb. 9.

The Chicago, Milwaukee & St. Paul is considering some new locomotives, but we have nothing official as to number or type.

The Chicago Great Western has ordered from the Richmond Locomotive Works the six passenger engines noted February 9.

The Baltimore & Lehigh has, as predicted in our issue of Feb. 23, ordered from the Richmond Locomotive & Machine Works five 10-wheel locomotives. They will have 19 in. x 24 in. cylinders, 62 in. drivers, total wheel base 22 ft. 6 in., driving wheel base 12 ft. and will weigh in working order 120,000 lbs., with 90,000 lbs. on drivers.

The Baltimore & Ohio order placed with the Baldwin Locomotive Works, as noted in our issue of March 2, calls for 100 consolidation compound engines weighing 177,400 lbs., with 159,800 lbs. on drivers. They will have 15½ in. x 26 in. x 30 in. cylinders, 54 in. driving wheels, extended wagon top type of boilers containing 246 iron tubes 14 ft. 10½ in. long, with an outside diameter of 2¼ in., working steam pressure, 200 lbs.; steel fireboxes, 9 ft. 10 in. long and 3 ft. 5 in. wide; tank capacity for water, 5,000 gals., and for coal, nine tons. They will be equipped with Westinghouse air brakes, steel axles, National hollow brake beams, Ross-Meehan brake shoes, Buckeye couplers, U. S. Metallic piston and valve rod packings, pneumatic sanding devices, Pickering springs and cast steel and cast iron wheel centers.

#### CAR BUILDING.

The Denver & Rio Grande is considering 10 or 12 cars for passenger service.

The Rio Grande Western is about ordering 8 to 12 cars for passenger service.

The Atlantic Coast Line is reported to be in the market for 200 freight cars.

The Vera Cruz & Pacific has ordered 10 box cars from the American Car & Foundry Co.

The Union Pacific is said to be getting preliminary prices on about 400 furniture cars.

The Chicago & Eastern Illinois is again considering steel cars and may also order three chair cars.

The Arizona & New Mexico expects to place an order soon for additional flat, box and coal cars.

The Southern has ordered from the American Car & Foundry Co. two cars for passenger service.

The Chicago & Quincy Mining Co. has placed an order with the American Car & Foundry Co. for 24 ore cars.

The New York Central has ordered 20 baggage cars from the American Car & Foundry Co. to be built at its Jeffersonville Works.

The Chicago, Lake Shore & Eastern, according to rumor, is considering ordering 150 steel cars to be either flat bottom or hopper bottom gondolas.

The Harrisburg & Southern, a new line in Illinois, noted on page 111 of our Construction Supplement (Feb. 9), is said to be considering ordering a few cars.

The Erie is building at its Buffalo shops 250 flat cars of 60,000 lbs. capacity. They will weigh 24,000 lbs., will be 40 ft. long and 9 ft. 2 in. wide, and will be equipped with Fox trucks and bolsters, Kewanee brake beams, Westinghouse brakes, Erie brasses, Gould couplers, Graham draft rigging, cast iron journal boxes, pressed steel journal box lids, Erie standard paints, French springs, 33 in. cast iron wheels.

The Omaha Packing Co. has ordered from the American Car & Foundry Co. the refrigerator cars noted Feb. 9. These cars will be 36 ft. 10 in. long, 8 ft. 10 in. wide, of 60,000 lbs. capacity, and for April and May delivery. They will have American Steel trucks and bolsters, steel axles, Sargent brake shoes, Westinghouse air brakes, Moore-Jones brasses, Janney couplers, McCord journal boxes (rubberoid roofs and Omaha Packing Co.'s draft rigging).

The Colorado & Southern let contracts on Feb. 23 to the American Car & Foundry Co. for four first-class coaches and to the Pullman Co. for one cafe car, all for June delivery. The cafe car will be 64 ft. 2 in. long, 9 ft. 8 in. wide and 6 ft. 8½ in. high, and will have National hollow brake beams, Paige steel tired wheels, Pullman standard trucks, canvas roof and Scarritt stationary seats upholstered in leather. The coaches will be 63 ft. 7½ in. long, 9 ft. 3 in. wide and 6 ft. 8 in. high, with Sterlingworth brake beams, tin roofs, Harrison dust guards, high-backed seats and chilled iron wheels. All the cars will be equipped with Westinghouse air brakes, Fulton brasses, National couplers, Pantasote curtains with Forsythe curtain fixtures, Safety Car Heating & Lighting Co.'s steam heating system, Pullman wide vestibules, Standard steel platforms, Pickering springs, Fletcher journal box lids, Pullman standard paint, and lighted by Pintsch gas.

The Metropolitan Elevated of Chicago has issued specifications for 56 trailers, for which bids will be received next week.

The South Side Elevated has ordered from the Jewett Car Co. the 30 passenger cars noted Feb. 2. It is understood that 20 more may be ordered.

#### BRIDGE BUILDING.

ALMONTE, ONT.—Commissioners have reported to Lanard township council that it is necessary to rebuild the bridge over the Indian River.

AUBURN, IND.—It is stated that bids are wanted March 8 for a steel bridge over Fish Creek in Troy Township; also for seven smaller iron structures. Frank P. Saller, County Auditor.

AUSTIN, TEX.—The Comptroller on Feb. 27 registered \$30,000 of Colorado County bridge bonds.

BUFFALO, N. Y.—Among the improvements recommended in the annual report of the D., L. & W. for Buffalo is the elevation of tracks by which three or four grade crossings of streets will be done away with during the current year. The city of Buffalo, through its Grade Crossings Commission, assumes half this expense.

The city of Buffalo will build a riveted truss bridge about 150 ft. long over the Buffalo River at Seneca St. F. V. E. Bardol, Chief Engineer, Board of Public Works.

CHICAGO, ILL.—An ordinance has been introduced in the City Council providing for plans for a new bridge at Thirty-seventh St., to cost not less than \$100,000.

The bid of Roemheld & Gallery of Chicago, \$127,000, was the lowest received Feb. 21, for a Schinkle bascule bridge on Canal St. over the South Branch of the Chicago River.

COSHOCOTON, O.—The Wheeling & Lake Erie has let contracts to the Toledo Bridge Co. for a 100-ft. plate girder bridge to cross the Navarre. Another bridge is one span of 165 ft. through truss, to cross the canal near Avondale, O. Another is of three spans of 154 ft. each, to cross the Tuscarawas River near Coshocton, O.

DELAWARE, O.—Bids are wanted, according to report, on March 16 for a three-span bridge, 246 ft. over all, across the Oleantangy River. E. E. Naylor, City Clerk.

FAIR BLUFF, N. C.—A bridge is proposed across the Lumber River in Columbus County, between Fair Bluff and Bardman.

FLINT, MICH.—The Chicago & Grand Trunk Ry. has been given permission by the Michigan Railroad Commissioner to build a bridge over the Pere Marquette in Flint.

HOUSTON, TEX.—The question of a new bridge over the bayou at the foot of Travis St. was recently before the City Council.

KANSAS CITY, MO.—We are told that the Metropolitan Ry. Co. prefers only a limited competition of bids on the Agnes Ave. viaduct. Daniel Bontecou, Engineer. Two other viaducts are in contemplation by this company to be built during the coming summer. One is the Allen Ave. viaduct of two spans, and the other is the Lexington Ave. viaduct over Chestnut Ave., requiring three spans.

KINGSVILLE, ONT.—A new railroad bridge will be built over Wigle Creek, west of this city.

MASS CITY, MICH.—The Chicago & Grand Trunk will cross the Pere Marquette by an overhead bridge at this point, on a projected extension.

METHUEN, MASS.—It is proposed to rebuild the bridge over the Boston & Maine between Lowell and Osgood Sts.

MONROE, ORE.—It is stated that a drawbridge will be built over Long Tom River several miles above this place, to be similar in design to the one for which a contract was recently let.

MONTGOMERY, ALA.—The Tallahassee & Montgomery bridge across the Alabama River was not destroyed, as recently reported.

NEW HAVEN, CONN.—The order of the War Department to the city of New Haven and the Town of Orange in regard to a bridge over West River at Kimberley Ave. requires that the bridge have a clear draw opening of 45 ft. with masonry piers 12 ft. below the plane of mean low water. The question of the kind of draw span is being considered and plans or suggestions will be appreciated by C. T. Driscoll, Mayor of New Haven.

NICHOLS, N. Y.—The matter of a bridge over the Susquehanna River between Owego and Sayre is again under consideration. An appropriation will be asked from the Legislature.

OAKLAND, CAL.—A new bridge is proposed on Harmon Ave. to replace the present structure.

OSWEGO, N. Y.—The Western New York & Pennsylvania received bids on March 1 for a steel bridge 132 ft. 6 in. long over Oswego Creek at this place, and for a steel bridge 154 ft. long over the Allegheny River at Larabee, Pa.

OTTAWA, ONT.—Bids will be received March 14 for the steel deck bridge to be built over Carp River.

We are told that the County Commissioners have in contemplation another bridge, but no plans have been made as yet. Chas. Macnab, County Clerk. (Feb. 23, p. 126.)

PETERSBOROUGH, ONT.—The proposed bridge over Chemung Lake will be a floating bridge, to cost \$30,000. A government subsidy of one-third of the cost will be given.

PHILADELPHIA, PA.—The Survey Committee of the City Council has recommended an appropriation for a bridge over the Pennsylvania RR. on the line of Coulter St. The structure will probably cost \$25,000. The Pennsylvania RR. has under consideration a plan for a bridge over Market St.

PIQUA, O.—A petition is before the County Commissioners for an iron hoist bridge over the Miami and Erie Canal at Ash St., Piqua.

PORT ARTHUR, ONT.—Messrs. McKenzie, Mann & Co., Toronto, Ont., are in charge of building the Minnesota and Ontario bridge across Rainy River. (Feb. 16, p. 110.)

RED WING, MINN.—A new bridge, according to report, will probably replace the Wisconsin channel bridge.

ROCKPORT, MISS.—A bill has been passed by Congress authorizing a bridge over the Pearl River at Rockport.

ST. CATHARINES, ONT.—The Grand Trunk will rebuild the bridge over the Gordon River in connection with its plan to double track the road between Hamilton, Ont., and Niagara Falls.

SAN FRANCISCO, CAL.—We are told that the Southern Pacific Co. has not let the contracts for the proposed new Bear and Santa Ana river bridges.

SCRANTON, PA.—It is stated that the proposition to issue bonds for the proposed West Lackawanna Ave. viaduct was defeated on Feb. 20. Joseph P. Phillips, City Engineer.

SHREVEPORT, LA.—The President has signed a bill to permit the Texarkana, Shreveport & Natchez Ry. to build a bridge over Twelve Mile Bayou, near Shreveport.

SPRINGFIELD, MASS.—Engineer Mace Moulton has submitted four propositions to the City Council for the approach to the proposed new bridge over the Connecticut River.

SYRACUSE, N. Y.—A bridge is proposed over the Oneida River at Three Rivers, Onondaga County. The Legislature will be asked to make an appropriation.

WACO, TEX.—An election will be held April 28 to consider issuing bonds for the proposed 300-ft. iron bridge over the Brazos River.

WATERTOWN, N. Y.—It is proposed to build an overhead crossing over the Rome, Watertown & Ogdensburg tracks on Arsenal St., at Watertown Junction.

WILMERDING, PA.—The United Traction Co. of Pittsburgh, it is reported, has decided on plans for a \$15,000 drawbridge over the Pennsylvania RR. tracks to West Wilmerding for the line of the East McKeesport Ry. Co.

WISCASSET, ME.—Four spans of Long bridge over the Sheepscot River between this place and Edgcomb were carried away last week by an ice jam.

#### Other Structures.

BALTIMORE, MD.—The Baltimore, Chesapeake & Atlantic has plans under consideration for improvements to the terminal facilities. One of the piers will be entirely rebuilt and a large office and waiting-room built. A bridge is to be built over Light St. The trainshed will also be made larger.

BINGHAMTON, N. Y.—The Delaware, Lackawanna & Western proposes to build a new passenger station and make changes in the freight and roundhouse facilities.

CHESTER, PA.—The Seaboard Steel Co. has been formed with a capital stock of \$500,000 to make steel castings. W. C. Sproul, President, and Mirabeau Sims, formerly of the General Electric Co., are interested. There will be two open-hearth furnaces and a foundry and chipping shop, 550 ft. long.

CHICAGO, ILL.—A second blast furnace will be built by the Iroquois Iron Co. at its plant in South Chicago. Julian Kennedy is the Consulting Engineer.

DEPOT HARBOR, ONT.—Early in the spring the Canada Atlantic Ry. will build the proposed elevator at Depot Harbor.

JUAREZ, MEX.—The passenger and freight station of the Rio Grande, Sierra Madre & Pacific was



burned Feb. 25, and considerable freight and baggage was destroyed.

**LACONIA, N. H.**—Work has been begun on the enlargement of the shops of the Laconia Car Co. by Wallace Bros.

**MAUCH CHUNK, PA.**—The Lehigh Valley will build a new passenger station at East Mauch Chunk, for which plans have already been made.

**MEMPHIS, TENN.**—The Louisville & Nashville is receiving bids on a new freight depot in North Memphis. It will cost \$20,000. It will front on Second St. and run back to Third St., taking in an entire block, being 320 ft. long and 56 ft. wide. The building will be of stone and brick.

**QUITMAN, GA.**—The South Georgia will build car and engine shops, and will enlarge its yards at this place.

**SIOUX CITY, IA.**—The Trust Company of North America, which owns the Union passenger station and terminal at this place, is reported considering improvements.

**TACOMA, WASH.**—Work has been begun by the Northern Pacific on the new dock and warehouse north of the present Oriental wharf. The new dock will be 120 ft. wide by 600 ft. long. The warehouse will be as large as the present ocean dock warehouse. Contracts for dredging the channel to the new wheat warehouse will soon be let. The contract for the wheat warehouse has not been let.

**WAUKESHA, WIS.**—The Modern Steel Structural Co. has been organized with \$100,000 capital to engage in making and erecting steel structural work. S. B. Harding, North Milwaukee, is President; Geo. Harding, Waukesha, Vice-President; S. Breese, Jr., secretary and treasurer. A plant will be built and operations will be under the management of S. B. Harding, who at present is with the Wisconsin Bridge & Iron Co.

**WILMINGTON, DEL.**—The Diamond State Steel Co. will build another building to cost \$30,000.

**WICHITA, KAN.**—The Missouri Pacific's new passenger station and office building to be built at Wichita will be on Douglas Ave. It will be two stories high, 66 x 112 ft. of brick and stone, and cost \$18,000. E. Fisher, Engineer of Bridges and Buildings, made the plans. Work will be begun in about four weeks.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xli.)

##### The St. Louis Railway Club.

At the meeting to be held Friday, March 9, a paper on "The Politics of the Steam Engine" will be presented by Mr. Fred. W. Lehman.

##### Railway Signaling Club.

A meeting of the Railway Signaling Club will be held Tuesday afternoon, March 13, at the Great Northern Hotel, Chicago. A paper, "Pipe Connected Signals for Mechanical Interlocking Plants" will be presented by Mr. George S. Pfisterer, Foreman of Signals of the Chicago & Eastern Illinois, and one on "Maintenance and Inspection of Automatic Electric Signals," by H. S. Balliet, Supervisor of Automatic Signals of the Lehigh Valley.

##### American Society of Civil Engineers.

At the meeting of March 7 the paper presented was "Experiments on the Flow of Water in the Six-foot Steel and Wood Pipe Line of the Pioneer Electric Power Company at Ogden, Utah, Second Series." The paper is by Messrs. Charles B. Marx, M., Charles B. Wing, Asso. M., and Leander M. Hoskins.

At the meeting to be held March 21 the paper will be "History of the Pennsylvania Avenue Subway, Philadelphia, and Sewer Construction Connected Therewith," by Messrs. George S. Webster and Samuel T. Wagner, members of the Society. This paper is 30 pages in length and excellently illustrated. It is printed in the February Proceedings of the Society.

The same number of the Proceedings contains continued discussions on papers which have already been presented.

##### Central Railway Club.

A meeting will be held at the Hotel Iroquois, Buffalo, N. Y., on Friday, March 9. Prof. Victor C. Alderson, Dean of the Technical College of Armour Institute of Technology, Chicago, has accepted an invitation to be the guest of the club on this occasion, and will address the members upon "The Economic Aspect of Technical Education." The Executive Committee has agreed upon the following subjects and committees to report thereon:

Best Form of Construction, and Methods of Ventilating, Heating and General Equipment of Roundhouses. Committee: W. H. Marshall, Chairman; George W. West, C. H. Potts.

Standard Box Cars; technical details of construction along the lines recommended by the Committee on Typical Dimensions, whose report was presented at the January meeting. Committee: L. T. Canfield, H. F. Ball.

Revision of the Rules of Interchange: J. R. Petrie, G. N. Dow, C. H. Potts.

Suggestions as to subjects and questions for either reports or impromptu debates are solicited by the officers and Executive Committee and will be welcomed as tending to advance the interest and practical benefits of the meetings.

The Committee on Revision of the Rules of Interchange of the Central Railway Club recommend changes in the M. C. B. rules numbered 3, 4 and 5.

##### American Institute of Electrical Engineers.

The 140th meeting of the Institute was held at 12 West 31st St., New York, on Wednesday, Feb. 28. A note on "A Faradimeter" was presented by Dr. M. I. Pupin and the instrument described and explained by the author was exhibited by him. Messrs. Hering, Wolcott, Bradley and Reed took part in the discussion. A paper was read by Mr. Edward C. Boynton of New Haven, entitled "Notes on Electric Traction Under Steam Railroad Conditions." The discussion was opened by Mr. F. J. Sprague and continued by Messrs. Hutchinson, Hanchett, Lamb, Ries, Pope, Holbrook, Mailloux, Atwood and Emerson.

Mr. Sprague believes in the gradual encroachment of electric traction on steam railroads, but clearly states that electricity will not be used under present steam railroad conditions. One of the most se-

rious conditions to contend with is the running of passenger and freight trains on the same track. He discussed the question of multiple unit control and gave the opinion that the day was rapidly coming when all the motors on a train would be controlled from one controller on a car. He discussed the question of storage batteries in central stations and noted the rapid introduction of these for central station work to take the peak of the load in the hours of heavy traffic. It was voted by the Executive Committee that the annual business meeting be held in New York City on May 15. On the afternoon of the following day, May 16, the General Meeting for the reading and discussion of professional papers will open at Philadelphia, continuing possibly for three days.

##### American Society of Mechanical Engineers.

The meeting on Tuesday evening of this week was largely attended, and the paper and discussion awakened considerable interest. As announced, Mr. Bert C. Ball discussed the question of cylinder proportions of compound engines. He took up the method of drawing indicator cards and the proportioning of cylinders of multi-cylinder engines for varying conditions of service. Mr. Ball noted that engines, to show good economy, must not be expected to run much on a large overload. The paper included a well considered discussion and a judicious criticism of Mr. Geo. I. Rockwood's theory of compound engines, with special reference to the drop between the cylinders. In the main, Mr. Ball agrees with Mr. Rockwood as to cylinder proportions, ratio of expansion, etc., but questions the validity of the argument in his early discussions of the question, on the ground that Mr. R. virtually concludes that a triple expansion engine without drop is not as economical as a compound with considerable drop in pressure between the cylinders. Messrs. Rockwood, Kent, F. H. Ball, Bolton and others took part in the discussion. It was urged by Mr. Kent that engine builders take up this question and make experiments for the two classes of engines under precisely similar conditions as to exhaust openings, temperatures, etc. He noted that we were not any closer to the real facts in the case than we were in 1892 when Mr. Rockwood reported his tests on the two classes of engines. Mr. Rockwood announced that he had modified his views somewhat and recognized the fact that with high pressures there was no question but that a triple expansion engine would in some installations be more economical than a compound. In a word, every problem must be considered by itself with all its conditions taken into account. As far as the real value of the discussion went, this was probably the most profitable meeting yet held under the direction of the Juniors.

#### PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. William E. Henry, a railroad contractor and Roadmaster of the Chicago & Alton from 1865 to 1870, died at his home in Joliet, Ill., March 3, aged 79 years.

—Mr. Solon Humphreys, Treasurer and Director of the Rio Grande, Sierra Madre & Pacific Railroad, died in New York City March 6, aged 79 years. He was at one time President of the Wabash Railroad.

—Major James B. Washington, who died March 6, at Pittsburgh, Pa., was for many years, beginning about 1865, in the service of the Baltimore & Ohio as Auditor and Secretary on the Pittsburgh & Connellsville, and as President of several auxiliary lines.

—Mr. H. F. Clark died at Springfield, Ill., March 1, aged 66 years. Mr. Clark formerly held the positions of General Manager of the Toledo, Peoria & Western, Superintendent of the Middle Division of the Wabash, General Manager of the Keokuk & Western, Superintendent of the Vicksburg Division of the Queen & Crescent, and General Superintendent of the Cincinnati Southern.

—Mr. George Bell Reeve, who on May 1 will resign as General Traffic Manager of the Grand Trunk, was born in Surrey County, England, in 1840. When but 20 years of age, Mr. Reeve entered the railroad service as Freight Clerk on the Grand Trunk and served this company from then until 1881 as telegraph operator, dispatcher and Assistant General Freight Agent. In the latter year he was made Traffic Manager of the company's Western line, the Chicago & Grand Trunk. In 1896 Mr. Reeve became General Traffic Manager of the Grand Trunk.

—Mr. John M. Holt, who has been connected with the Southern Railway for a number of years as General Foreman of Car Repairs, died suddenly at Washington, D. C., Feb. 25. Mr. Holt began his railroad career on the North Carolina road in 1865 as an apprentice in the car department, and when this road was absorbed by the Richmond & Danville was transferred to the Manchester shops as Foreman of Car Repairs. When this road was reorganized as the Southern Railway, Mr. Holt became General Foreman of Car Repairs at Washington, D. C.

—Mr. Thomas Fitzgerald, whose appointment as General Superintendent of the Philadelphia Division and the Main Line and Branches of the Baltimore & Ohio was noted in a recent issue of the Gazette, was born at Fairmont, W. Va. Mr. Fitzgerald has been connected with the Baltimore & Ohio from the time he entered railroad service, which was in 1866 as water boy. From this position he rose steadily, serving as telegraph messenger boy, telegraph operator and dispatcher, at various points, until he became Master of Transportation. In 1886 he was made Division Superintendent, and was on different divisions until 1894, when he was appointed Superintendent of Transportation and General Superintendent of the Philadelphia and Main Stem Divisions.

—Mr. R. J. Parker has been appointed Superintendent of the Western Division of the Atchison, Topeka & Santa Fe, with office at Pueblo, Col., as announced in our issue of Feb. 2, page 79. Mr. Parker was born June 27, 1857, at Roscoe, Minn., and educated at the Shattuck School, Faribault, Minn. He entered service in 1872 as brakeman on the Chicago, Milwaukee & St. Paul. He came to be a conductor and in 1881 went to the Northern Pacific and took charge of a construction train. Then he went to the Atchison, Topeka & Santa Fe as conductor in charge of a construction train and in 1887 was ap-

pointed Division Roadmaster on the Middle Division of that system. From Jan. 1, 1893, to Feb. 1, 1896, he was general Roadmaster of the Eastern Division; until Jan. 1, 1897, Division Roadmaster of the same division, and until Feb. 1, 1900, Division Superintendent of the Middle Division.

—We have recently noted the fact that Mr. R. F. Hoffman has been appointed Mechanical Engineer of the Atchison, with headquarters at Topeka. Mr. Hoffman is 36 years old, a native of Danville, Pa. He received a common school education and then worked for several years in a rolling mill and a machine shop, then for two years on locomotive, blast furnace and rolling mill work in the mechanical department of the Philadelphia & Reading Coal & Iron Co., then three years in the locomotive shops of the Lake Shore & Michigan Southern, at Elkhart, Ind. He has since been in the mechanical department of the South Side Elevated in Chicago and in the engineering corps of the Northwestern Elevated and Union Loop and of the Illinois Central. Since June, 1898, he has been with the mechanical department of the Atchison, Topeka & Santa Fe doing expert locomotive work and general mechanical engineering.

—Mr. J. C. Brackenridge, Chief Engineer in charge of the construction and maintenance departments of the lines of the Brooklyn Rapid Transit Co., has been appointed Acting General Manager, to relieve the President, Mr. Clinton L. Rossiter, from many details to which he has heretofore given personal supervision. From 1884 to 1889 Mr. Brackenridge was Assistant Engineer in charge of foundation construction and track work during the building of the Brooklyn and Union elevated railroads of Brooklyn. Later he was with the Department of City Works, of Brooklyn, as Assistant Engineer of the water-works extension east of Rockville Center, L. I. He was Chief Engineer of the track department of the Brooklyn Heights and the Brooklyn, Queens County & Suburban companies, now the Brooklyn Rapid Transit Co., and while in that position acted as Engineer of all the trolley-electric roads of Brooklyn in the matter of extending their lines across the New York and Brooklyn Bridge.

—Col. Timothy S. Williams, formerly Secretary and Treasurer of the Brooklyn Rapid Transit Co., has been elected Vice-President of that company, in charge of matters relating to taxes, insurance, real estate, franchises, legal rights, litigation (other than negligence and land damage) and legislation. This is a newly created office, and the Directors at the same time provided for another Vice-President to take charge of negligence and land damage cases, which position is yet to be filled. These two new offices have been created to relieve Col. Williams, who, heretofore, has filled the positions now divided amongst three. Previous to his election in 1895 as Secretary and Treasurer of the Brooklyn Heights road, Col. Williams was private Secretary to the late Governor Flower, and also served in the same capacity under Governor Hill. With the formation of the Brooklyn Rapid Transit Co., of which system the Brooklyn Heights is a part, Col. Williams was elected Secretary and Treasurer. He is a graduate of Cornell University, Class of '84. C. D. Meneely, heretofore Assistant Secretary and Assistant Treasurer of the Brooklyn Rapid Transit Co., has been appointed Secretary and Treasurer.

—Mr. Bradford Dunham resigned last January as General Superintendent of the Plant System, as has already been told in the Railroad Gazette. Mr. Dunham was born at Cedar Point, Liberty Co., Ga., June 19, 1838. He worked for three years in a machine shop, became a freight forwarding clerk on the Central Railroad of Georgia, came to be a conductor, and in December of 1862 was made Master of Transportation on the Alabama & Florida Railroad, and three years later was made Assistant Superintendent of the road, as well as Master of Transportation. In 1867 he became Superintendent of Construction and Master of Transportation on the Montgomery & Eufaula Railroad, and in the same year was made Superintendent. He then served as Chief Engineer, Superintendent of Construction and General Superintendent of various railroads, and finally became General Manager of the Western Lines of the Baltimore & Ohio and later Assistant to the Vice-President, and still later General Manager of the system. This latter position he held until December, 1886, when he retired from railroad work and went to Montgomery, Ala., as President of an iron works and of the Electric Light & Power Company. Shortly after, however, he got back into railroad work, serving as Vice-President and General Superintendent of the Montgomery & Florida, Receiver of that company, General Superintendent and Trustee, until it was purchased by the A. V. & I. Company; General Superintendent of the Alabama Midland; and Feb. 15, 1895, he became General Superintendent of the Plant System, helping in the consolidation of the various roads into one general system. This office he filled until Jan. 23, 1900, when he resigned. Mr. Dunham is not only an operating officer, but a civil engineer and a mechanical engineer.

#### ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—G. T. Neubert, Division Master Mechanic at Arkansas City, Kan., has been appointed Division Master Mechanic at Newton, Kan., succeeding J. E. Gavitt.

Atlantic City (Reading).—Theodore Voorhees has been made First Vice-President and C. E. Henderson Second Vice-President.

Baltimore & Ohio.—The position of Master Mechanic at Grafton, W. Va., is abolished. P. Hayden has been appointed General Foreman at Benwood, W. Va., succeeding J. F. Prendergast, who becomes General Foreman at Grafton, W. Va., succeeding Mr. Hayden. P. J. Harrigan has been appointed General Foreman at Connellsville, Pa., succeeding D. Witherspoon, appointed General Foreman at Cumberland, Md., effective March 1.

The following changes have been made among the Division Engineers Maintenance of Way owing to the resignation of B. T. Fendall: G. B. Owen succeeds Mr. Fendall at Baltimore, Md.; J. F. Cassell succeeds Mr. Owen at Cumberland, Md., and J. Burke succeeds Mr. Cassell at Grafton, W. Va.

Buffalo, Attica & Arcade.—The headquarters of C. E. Davis, Auditor and General Freight and Passenger Agent, have been removed from Attica, N. Y., to Arcade, N. Y.



**Chatham & Lebanon Valley.**—D. H. Johnson has been appointed General Freight and Passenger Agent, with headquarters at Chatham, N. Y.

**Chicago & Alton.**—The headquarters of Willis E. Gray, General Superintendent, have been removed from Bloomington, Ill., to Chicago, Ill. H. Monkhouse, Superintendent of Machinery, has resigned, and it is reported that he is going to the Delaware, Lackawanna & Western.

**Chicago, Peoria & St. Paul Railway Co. of Illinois.**—This is the name of the company which succeeds the St. Louis, Chicago & St. Paul Railway of Illinois and the Chicago, Peoria & St. Louis Railroad of Illinois. The Litchfield branch of the latter railroad passes to a separate corporation, but will be operated as a part of the Chicago, Peoria & St. Louis Railway. Curtiss Millard is appointed General Manager, with headquarters at Springfield, and Ralph Blaisdell, in addition to his duties as Secretary and Treasurer, is appointed Auditor. W. M. Bushnell, General Freight Agent; E. A. Williams, General Passenger and Ticket Agent; and W. E. Killen, Superintendent of Motive Power and Equipment, retain the same offices and titles as before. Charles E. Kimball is President of the new company.

**Chicago, Rock Island & Pacific.**—J. R. Blair has been appointed Superintendent of Terminals, with headquarters at Kansas City, Mo.

**Cincinnati & Muskingum Valley.**—A. L. Morgan has been appointed Engineer Maintenance of Way, with headquarters at Zanesville, O., succeeding D. B. Johnston, effective March 1.

**Copper Range.**—R. T. McKeever has been appointed General Manager, with headquarters at Houghton, Mich., succeeding C. A. Wright, resigned.

**Delaware, Lackawanna & Western.**—T. Thatcher, heretofore Division Master Mechanic at Utica, N. Y., has been transferred to the Utica shops, where he will be General Foreman, succeeding C. H. Brown.

**Fitchburg.**—Edward Elden has been appointed Division Master Mechanic of the Eastern Division, with headquarters at Boston, Mass., succeeding F. C. Smith, resigned, effective March 1.

**Grand Trunk.**—G. B. Reeve, General Traffic Manager at Montreal, Que., has resigned. Effective May 1.

**Illinois Central.**—G. A. Clark, heretofore Trainmaster at Centralia, Ill., has been appointed Superintendent of the Fort Dodge & Omaha Division. Effective March 1.

**International & Great Northern.**—J. B. Bartholomew has been appointed Assistant General Freight Agent, with headquarters at Palestine, Tex.

**Kansas City, Pittsburgh & Gulf.**—J. J. Merrill, Superintendent of Transportation at Kansas City, Mo., has resigned.

**Litchfield & Madison.**—The officers of this newly incorporated company are: President, Charles Kimball, and Secretary and Treasurer, Ralph Blaisdell. The Directors are: C. E. Kimball and L. D. Mumford, of New York; E. Smith, St. Louis; James Duncan, Alton, Ill.; and Bluford Wilson, C. Millard and R. Blaisdell of Springfield. (See RR. Construction column, March 2, p. 146.)

**Mexican Central.**—The rumor that Geo. F. Hawks, Division Superintendent at Cardenas, Mex., had tendered his resignation is incorrect.

**New York, New Haven & Hartford.**—C. F. Kennedy has been appointed Assistant Superintendent of the Worcester Division. Effective March 1.

**Norfolk & Southern.**—William W. King has been appointed General Superintendent of Transportation and Maintenance of Way and Structures, effective March 1.

**Ohio & Little Kanawha.**—J. Hope Sutor, heretofore Receiver for the Zanesville & Ohio, which recently passed under the control of the O. & L. K., has been appointed General Manager of the O. & L. K., with headquarters at Zanesville, O. Effective Feb. 28.

**Perkiomen.**—W. G. Besler has been appointed Superintendent, with headquarters at Reading, Pa., succeeding A. M. Wilson.

**Pittsburgh & Western.**—J. R. Lusk, Superintendent of Telegraph, will also assume the duties of Assistant Superintendent of the Western & Lake Divisions.

**Southern Pacific.**—At a meeting of the stockholders held March 1, George Crocker resigned as Director and Second Vice-President. H. E. Huntington was elected Second Vice-President to succeed Mr. Crocker. At the same meeting August Belmont, William E. Dodge and Charles H. Tweed were elected Directors.

**Union Pacific.**—Geo. F. Davis, heretofore Resident Engineer at Julesburg, Col., has been appointed to succeed E. Stenger, as Resident Engineer on construction at North Platte, Neb.

#### RAILROAD CONSTRUCTION. New Incorporations, Surveys, Etc.

**ARIZONA & NEW MEXICO.**—S. H. Buchanan of El Paso, Tex., has the contract for renewing and strengthening all the trestle bridges along this road, which is being changed to standard gage. He also has the contract for widening embankments, putting in new ties with Glendon longitudinal flange tie plates, and also for relaying 40 miles with heavier rails supplied by the Colorado Fuel & Iron Co. The Gillet-Herzog Mfg. Co. has completed two steel viaducts—one 180 ft. long and 50 ft. high, and the other 280 ft. long and 40 ft. high. The estimated cost of the improvements to track and bridges is about \$200,000.

**ABERDEEN & ROCK FISH.**—Six miles of track have already been laid on the extension from Raeford, N. C., and work on six additional miles is in progress.

**ABBOTTSFORD & NORTHEASTERN.**—This road now extends from Abbotsford to Athens, Wis., about

15 miles. Two extensions have been projected for some time—one from Athens southwest 35 miles to Wausau, and the other from Abbotsford northwest to Merrill. It is now stated that the extension to Wausau will be built and that it will be continued about 25 miles to Antigo.

**BALTIMORE & OHIO.**—We are told that the Chief Engineer knows nothing about the report that a branch of the Sharpsville line will be built from Oakland, Pa., to reach a steel plant south of Sharon. (Feb. 23, p. 127.)

**BALTIMORE SOUTHERN.**—A bill has been introduced in the Maryland House to authorize the Commissioners of Anne Arundel County to issue 5 per cent. bonds to an amount not more than \$200,000, to subscribe to the capital stock of this company, which proposes to build a railroad from Millersville, on the line of the Annapolis Junction, a part of the Annapolis, Washington & Baltimore, south through Anne Arundel and Calvert counties to Drum Point, about 50 miles.

**BOSTON & MAINE.**—Joseph L. Ross is reported to have the contract on the grade crossing work of the Boston & Maine between Portsmouth, N. H., and Salisbury, Mass., 12 miles.

**CAROLINA & NORTHWESTERN.**—It is stated that this company has secured the necessary ties for changing its line from narrow to standard gage and for the proposed extension. (Sept. 22, 1899, p. 667.)

**CHICAGO, MILWAUKEE & ST. PAUL.**—Surveys are at work on the line for the extension of the James River Division westward from Bowdle, S. D., through Walworth County, about 50 miles to the Missouri River. It is stated that the terminus will probably be near the mouth of the Grand River.

This company is reported getting options on the right of way for a branch line from Elgin, Ill., north about 45 miles to Delavan Lake, Wis.

The contract to grade five miles of roadbed to connect Crystal Falls, Mich., with the main line, has been let to Kimball, Willis & Shaller of St. Paul, Minn.

**CHICAGO, ROCK ISLAND & PACIFIC.**—The contract for grading the extension from Kingfisher to Guthrie, O. T., has been let to Wogan & McNealy of St. Joseph, Mo. About 300 men are reported at work at the Kingfisher end.

**CHOCTAW, OKLAHOMA & GULF.**—Surveys have been completed for a proposed extension to Amarillo, Tex.; also to Denison, Tex. The first extension will be about 200 miles long.

**CLEVELAND, LORAIN & WHEELING.**—The stockholders have authorized an issue of \$10,000,000 in 4½ per cent. bonds, part of which will be used to retire \$7,000,000 outstanding bonds. The remainder will be applied to relaying and rebalasting tracks, buying new equipment, etc.

**COLUMBIA RAILWAY & NAVIGATION.**—Frank H. Graves, Treasurer of this company, is reported as stating that the grading of the road will be completed by April 1, and that the rails have already been delivered. Work is in progress on the first nine miles near The Dalles, Ore.

**COVELLO & COLUMBIA RIVER.**—Surveys are reported being made for this railroad, which was incorporated in Washington Feb. 13. (Feb. 23, p. 127.)

**DULUTH & NEW ORLEANS.**—This company has filed amended articles of incorporation in Iowa which provide that the company can build and operate a railroad from Duluth, Minn., in a southerly direction to New Orleans, either by steam or electricity. The capital stock was also increased from \$300,000 to \$700,000. Bonds to the amount of \$2,500,000 have been sold.

**FORT SCOTT CENTRAL.**—This Kansas company has filed articles of incorporation in Missouri, with a capital of \$2,000,000. It is stated \$650,000 will be used in Missouri. The headquarters are at St. Louis.

**FREDERICK, THURMONT & NORTHERN.**—A bill is before the Maryland Legislature to enlarge the powers of this company, and permitting the name to be changed to the Washington, Frederick & Gettysburg. This road is proposed from the suburbs of Washington to the Pennsylvania State line, about 30 miles. (Oct. 6, 1899, p. 701.)

**GASPE SHORT LINE.**—C. B. Knowlton of Quebec, and others, are applying for a charter for this company to build from Gaspé Basin to connect with the Intercolonial at Casupocal in Rimouski County. The capital is to be \$500,000, with power to double it, and the company is to be allowed to issue bonds to the extent of \$20,000 per mile.

**GRAND TRUNK.**—The Michigan Railroad Commissioner has approved a route for a line proposed to be built by the Chicago & Grand Trunk through Genesee County and the city of Flint, with an overhead crossing of the Pere Marquette road in the city of Flint.

**HOUSTON & TEXAS CENTRAL.**—It is stated that an extension will be built from Wortham west about 45 miles to Hillsboro, Tex. Grading is reported in progress at Wortham.

**INDIANA & OHIO.**—This company was incorporated in Indiana Feb. 26, with a capital of \$300,000, to build a railroad from Albany, Delaware County, north about 30 miles to Bluffton, Wells County, with a possible extension to Portland and Hartford City. The directors are: J. W. Kern, Indianapolis; Robert S. Duncan, Indianapolis; E. C. Mason, Buffalo, N. Y.; W. L. Adams, Niagara Falls, N. Y.; Chas. W. Moores and R. P. Duncan, Indianapolis; A. M. Gore, St. Louis, Mo.; R. L. Porter and Geo. H. Gifford, Tipton, Ind. J. W. Gore will be President; E. C. Duncan, Vice-President, and W. L. Adams, Secretary and Treasurer.

**JANESVILLE & SOUTHWESTERN.**—This company has been incorporated in Wisconsin, with a capital of \$2,000,000, to build a railroad from Janesville 35 miles southeast to a point in the town of Bloomfield, Walworth County, connecting with the Cook, Lake & McHenry Counties Ry. This project is understood to be in the interest of the Chicago, Milwaukee & St. Paul. Among the directors are Peter M. Myers of Milwaukee, Secretary of the C., M. & St. P.; Chas. H. Van Alstine and Elzie W. Adams

of Milwaukee, and Henry R. Williams, B. G. Lennox, Fred. T. Ranney and Burton Hanson of Chicago, Ill.

**KANSAS CITY, NEW MEXICO & ORIENT.**—Arthur E. Stilwell of Kansas City, Mo., one of the promoters of this company, the incorporation of which was noted in this column Feb. 23, p. 128, states that the estimated cost of building the road is \$27,000,000, or \$15,000 a mile, of which one-third is said to be pledged. The present capital of \$1,000,000 will be increased later. Perpetual rights at Topolobampo Harbor, it is stated, have been granted by the Mexican Government, which will also grant subsidies ranging from \$12,000 to about \$22,000 per mile. As projected, the road will be about 1,800 miles long.

**LOUISVILLE & NASHVILLE.**—It is stated that this company has let the contract for building the projected branch line from Hanceville, Blount County, Ala., on the main line, to Strout's Mountain, six miles, to mineral lands. (Feb. 9, p. 96.)

The Northern Alabama Ry. is surveying for a 55-mile line, from a point on the main line about 60 miles north of Birmingham, through Cullman, Blount, Walker and Jefferson counties, Alabama, to a point on the Birmingham Mineral, near Bessemer, Ala.

**MEXICAN CENTRAL.**—Lewis Kingman, Chief Engineer of this company, states that 39.4 miles of track were laid in 1899, from Yurecuaro to Chavinda on the line to Arlo, and that work is in progress from Chavinda to Tinguindin 33.6 miles. Work is also in progress on a line from La Vega to San Marcos, 30 miles, and on a line from Parral to Rio Florida, 37 miles. Work will soon be begun on the line from Guadalajara to Colima, a distance of 162 miles.

**MINERAL RANGE.**—Maps have been approved by the Railroad Commissioner of Michigan showing a proposed extension of this railroad in Ontonagon County, with a crossing of the line of the Copper Range RR. near Mass City.

**MISSOURI, KANSAS & TEXAS.**—This company is reported considering extensions from McKinney, Tex., to Whitesboro; also to Decatur, a total distance of 85 miles. Financial arrangements for building these extensions were made under the plan of reorganization for the Sherman, Shreveport & Southern.

**NEBRASKA & GULF.**—A bill has been introduced in the U. S. Senate granting the company right of way through the Omaha and Winnebago Indian reservations in the State of Nebraska, and extending the time within which the road may be built four years from next June. (Jan. 12, p. 30.)

**NEW YORK, NEW HAVEN & HARTFORD.**—It is stated that the Naugatuck Division, from the end of the double track to Derby, will be double-tracked during the coming season.

This company proposes to establish a transfer freight yard near Poquonnock, Conn., about five miles east of New London, on the Stonington Division.

**NEW YORK RAPID TRANSIT.**—Proposals are being received for the construction of the Rapid Transit Railroad of New York City. The work will be divided in fifteen or more sections and contractors are invited to bid on one or more sections, according to their ability and resources. Plans and specifications can be seen at the office of the Contractor, John E. McDonald, 21 Park Row, New York City.

The New York City Board of Estimate and Apportionment on March 1 authorized the issue of bonds at various periods and amounts to the extent of \$36,500,000 for the rapid transit railroad.

**NORFOLK & WESTERN.**—This company has bought the terminal property at Durham, N. C., and the line known as the Belt RR. The contract for grading these terminal grounds and for laying the necessary terminal tracks has been let. The Belt RR. runs from West Main St. to a point on the L. & D. branch of the N. & W., about three miles from Durham.

**NORTH CAROLINA ROADS.**—A Raleigh (N. C.) report states that the Raleigh Railroad & Lumber Co. will build a narrow-gauge railroad from Greenville to Fayetteville.

**OMAHA NORTHERN.**—It is reported that the promoters of this railroad have concluded their financial arrangements, and that work will be begun on the line within six weeks, under the supervision of E. P. Reynolds, Jr., of Wymore, Neb.

**PASCAGOULA & NORTHERN.**—This company has been granted a charter in Mississippi to build a line between Pascagoula and New Albany, about 275 miles. J. W. Stewart and A. S. Denny are interested.

**PENNSYLVANIA & BUFFALO CONNECTING.**—A charter was granted in Pennsylvania to this company Feb. 27, to build a line from Kane or Wilcox, on the Philadelphia & Erie, northward to Buffalo, N. Y., about 125 miles. Samuel Rea, Fourth Vice-President of the Pennsylvania, is named as President of the new company, and it is informally given out that the new company is formed in the interest of the Pennsylvania. At the same time, it is reported that the Pennsylvania is trying to secure a controlling interest in one of the existing lines to Buffalo, the Western New York & Pennsylvania.

See Pennsylvania in General Railroad News column.

**PENSACOLA & NORTHWESTERN.**—Work was begun Feb. 23 at Pensacola, Fla. The contracts were let some time ago.

**PHILADELPHIA & READING.**—This company has completed negotiations for 30 acres of land east of Harrisburg, Pa., toward Rutherford Station, upon which it is proposed to build about 15 miles of yard tracks.

**PITTSBURGH & LAKE ERIE.**—The improvements which this company is making at Glassport and McKeesport, Pa., are let to five contractors. All the grading is expected to be finished by April 1. Over \$500,000 will be spent on these improvements, and they will give the company a number of miles of new siding.

**PITTSBURGH, CONNELLSVILLE & WHEELING.**—This company was incorporated in West Virginia Feb. 27, to build and operate a railroad from Moundsville, W. Va., to Benwood and Wheeling, W.



Va. The authorized capital is \$3,000,000. The object is said to be to build a line from Connellsville in the Pittsburgh district to Wheeling, with a view to getting a share of the traffic in coke for Wheeling industries. The line will be about 50 miles long. The incorporators are: Alex. P. Funk, 71 Broadway, New York City; E. A. Holmes and A. C. Brown, New York City; C. A. Weaver and G. S. McFadden of Moundsville, W. Va.

**QUEBEC & LAKE ST. JOHN.**—See Railroad News Column.

**QUINCY & TORCH LAKE.**—Application has been received by the Railroad Commissioners of Michigan for approval of a proposed extension of the line in Houghton County, Mich., to a point on Portage Lake, with a crossing of the Hancock & Calumet.

**QUINCY, CARROLLTON & ST. LOUIS.**—This company has abandoned the plan of building an extension from Barnett, Ill., the present eastern terminus of the road, to a connection with the Peoria-St. Louis line, 2½ miles east of Barnett, but, according to report, will instead build a six-mile extension from Barnett to Litchfield, Ill. Right of way is now being secured. The company has trackage rights over the J. & St. L. between Barnett and Litchfield.

**RUTLAND.**—See Railroad News column.

**SEABOARD AIR LINE.**—The bill to incorporate the Richmond & Washington Air Line passed the Lower House of Congress March 1. The Virginia bill to incorporate this company has become a law. The R. & W. A. L. Company is formed to build, in the interest of the Seaboard Air Line, a railroad from Richmond, Va., to Washington, D. C.

This company is having surveys made for a branch line 50 miles long to run through Dahlonga and Clarksville, Ga., connecting with the main line of the Chattanooga, Augusta & Charleston, a projected railroad being built in the interest of the Seaboard.

**SOUTH CAROLINA & GEORGIA.**—It is stated that the Augusta Southern will straighten seven miles of road and make other improvements.

**SOUTHERN PACIFIC.**—Surveyors are again in the field to complete the survey for the proposed cut-off across the Great Salt Lake from Lucin to Ogden, Utah. This work will require considerable trestle and bridge work.

A survey of the Texas & New Orleans has been completed from Rockland northward into Nacogdoches, Tex., and now a preliminary survey is being made northward, with Jacksonville, on the International & Great Northern, 45 miles northwest of Nacogdoches, as the objective point.

**SOUTH GEORGIA.**—This road is to be extended south and it is proposed to build from its present terminus, Quitman, Ga., to Tampa, Fla., 200 miles. Surveys are being made for a connection with the Florida Central & Peninsular near Greenville, Fla., about 20 miles south from Quitman. The S. G. now runs between Quitman and Heartpine, 28 miles, connecting with the Georgia Southern & Florida and the Plant System.

**SUMPTER VALLEY.**—C. W. Nibley, Vice-President and General Manager, is reported as stating that the road will be extended southerly from Sumpter about 18 miles through Bonanza and on toward Prairie City.

**TENNESSEE & NORTH CAROLINA.**—This company was incorporated in Tennessee March 5, to build a road from Newport, Tenn., southeast about 15 miles to Haywood County, N. C., near the Big Pigeon River.

**TENNESSEE NORTHERN.**—This company is considering a 28-mile extension to Middlesboro, Ky., according to report.

**TEXAS ROADS.**—G. M. D. Grigsby is interested in a project to build a railroad from Longview, Tex., into Lamar County; also south from Longview to Sabine Pass.

A. J. Birchfield is reported interested in a plan to build a railroad from Alvin, Tex., to a point in Matagorda County.

**TRAVERSE CITY & LEELANAU.**—This company has been incorporated in Michigan, with a capital stock of \$300,000, to build a railroad from Traverse City to Northport, Leelanau County, a distance of about 35 miles. The directors are: J. S. Stearns, Ludington, Mich.; A. O. Wheeler, C. W. Taylor and G. G. Covell of Grand Rapids, and C. E. Murray, Traverse City.

**WABASH.**—Surveyors are in the field for a road projected two years ago, connecting Montpelier, O., on the Detroit-Chicago Division, with Toledo, O., a distance of about 55 miles. The line of the proposed road passes through Lucas, Fulton and Williams counties.

It is announced that this company, during the coming summer, will double-track its main line from Sangamon to Bement, Ill., 15 miles. The road from Sangamon to Decatur, six miles, will probably be double-tracked next year.

**WHITE PASS & YUKON.**—M. J. Heney is the contractor for the extension from Lake Bennett to White Horse, and it is expected that the line will be in operation by the opening of navigation.

**YORK SPRINGS.**—By a decision placed on file last week by Judge Swope at Gettysburg, Pa., this company is permitted to build its road between Dillsburg, York County, and York Springs. Work was stopped by an injunction last summer given to the Philadelphia, Harrisburg & Pittsburgh RR., which is a part of the Philadelphia & Reading, which alleged that the defendant company used the latter's right of way.

#### GENERAL RAILROAD NEWS.

**BOSTON & ALBANY.**—The bill to permit the lease of the Boston & Albany to the New York Central & Hudson River came before the House Committee of the Massachusetts Legislature on March 1. Mr. Hoar, counsel for the B. & A., presented an argument in favor of the lease. The matter has been laid over until March 20.

**CARSON & COLORADO.**—It is stated that this company has been acquired by the Southern Pacific. The C. & C. is 293 miles long and runs between Mound House, Nev., and Keeler, Cal., with a branch seven miles to Candelaria, Nev.

**CATAWISSA.**—Messrs. Drexel & Co., of Philadelphia, offer holders of the \$1,300,000 of 7 per cent. bonds, due Aug. 1, 1900, and the \$230,000 6 per cent. bonds due Aug. 2, 1902, the right to exchange their bonds for new first consolidated 50-year bonds, an equal amount of which has been reserved for this purpose. When these prior lien bonds are retired, the new consolidated bonds will be the first and only mortgage on the property.

**CHICAGO, PEORIA & ST. LOUIS.**—The reorganized C., P. & St. L. assumed control on March 1 of the St. Louis, Chicago & St. Paul and the Chicago, Peoria & St. Louis. Chas. P. Kimball of New York is President. (Jan. 12, p. 30.) See also Election and Appointment column.

**CINCINNATI SOUTHERN.**—An agreement has been made between the Sinking Fund Trustees and the Board of Trustees to prevent any conflict of authority between the two boards over the extension or refunding of the C. S. 7 per cent. and 7.3 per cent. bonds which are due July 1, 1902. A suit is now pending in the Supreme Court to test the power of the C. S. trustees.

**CLEVELAND & PITTSBURGH.**—The Pennsylvania Company has sold to Messrs. Speyer & Co. of New York, \$3,000,000 of Cleveland & Pittsburgh 3½ per cent. mortgage gold bonds, due in 1948.

**CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.**—Additional general mortgage 4 per cent. gold bonds of 1903, to the extent of \$5,000,000, have been listed by the New York Stock Exchange. Of the additional bonds, \$3,000,000 have been issued to retire prior liens as follows: \$3,000,000 C. C. & I. sinking fund bonds; \$52,000 Bellefontaine & Indiana first mortgage bonds; \$8,000,000 C. I. St. L. & C. general mortgage six per cent. Also bonds for \$2,000,000 have been sold to pay for new equipment and improvements. Of the latter bonds, \$1,000,000 were issued during the fiscal year ending June 30, 1898, and the remainder during the year ending June 30, 1899.

**DARDANELLE & RUSSELLVILLE.**—It is stated that arrangements have been made to reorganize this company with \$200,000 capital stock. An extension is proposed.

**DELAWARE VALLEY & KINGSTON.**—The Erie has filed a suit in equity against the Erie & Wyoming Valley and the Pennsylvania Coal Co., to prevent the building of the proposed independent railroad as projected by the D. V. & K. over the abandoned Delaware & Hudson Canal bed from Hawley, Pa., to Rondout, N. Y.

**DENVER & SOUTHWESTERN.**—Kessler & Co. of New York, and E. H. Rollins & Sons, of Boston, offer \$2,872,000 of this company's present issue of \$4,923,000 30-year sinking fund 5 per cent. gold bonds due Dec. 1, 1929. (Jan. 26, p. 64.)

**FITCHBURG.**—Judge Knowlton in the Supreme Court at Boston, Feb. 28, declined to grant the motion of the Central Massachusetts RR. to enjoin the proposed lease of the Fitchburg to the Boston & Maine.

**GREAT EASTERN.**—An action has been begun in the Superior Court, Quebec, against Mr. R. Prefontaine, M. P., who bought this property at auction sale, last August, and the directors of the road to annul the sale of the property on the ground of alleged irregularities. The Great Eastern is a link of the Atlantic & Lake Superior.

**GREAT NORTHERN.**—Additional preferred stock to the extent of \$9,000,000 has been listed by the New York Stock Exchange, making the total stock listed to date \$99,000,000. The new issue is made for the purpose of acquiring \$3,500,000 in stock of the Eastern Railway of Minnesota, and \$5,500,000 additional of the stock of the Willmar & Sioux Falls. These purchases will give the Great Northern the ownership of the entire stock of both companies. The mileage of the Eastern Railway of Minnesota is 412.48 main single track, and 17.28 miles of second main track. It operates seven miles of leased line. The Willmar & Sioux Falls is 430 miles long.

**KANSAS CITY, PITTSBURG & GULF.**—In the matter of the reorganization of the K. C., P. & G. and its terminal company, notice is given that the second installment on the stock of the K. C., P. & G., deposited with the reorganization committee June 14, 1899, is due on or before March 17.

The purchasing committee of the reorganization committee of the K. C., P. & G. will attend the foreclosure sale on March 19, at Joplin, Mo. This committee consists of Wm. F. Harritt and Silas Pettitt of Philadelphia, and Max Pam of Chicago. Under the terms of the sale no bids for less than \$12,500,000 will be received. All bidders must deposit with the Master the sum of \$100,000 in money or check, or bonds secured by mortgage of April 1, 1893, to the amount of \$300,000, which will be forfeited and applied to the expense of the sale and of the receivership in case the bidder shall not make good his bid. The sum of \$500,000 is to be paid down on the acceptance of the purchase bid.

**LAFAYETTE.**—J. C. Griffin, as trustee, has taken a mortgage on this road for \$40,000. The road is 22 miles long between Lafayette and Opelika, Ala.

**MOBILE, JACKSON & KANSAS CITY.**—At a meeting of the stockholders of this company held in Mobile, Ala., Feb. 24, slight changes were voted in the terms of the mortgage, and it was voted that the amount of bonded indebtedness should not exceed \$20,000 per mile of completed road. Stocks and bonds of this company were issued to the construction company for road completed.

**OHIO & LITTLE KANAWHA.**—This company, which recently bought the Zanesville & Ohio River, took possession of the property on March 1. (Jan. 26, p. 64.)

**PENNSYLVANIA.**—The Pennsylvania has offered to buy all the capital stock of the Erie & Western Transportation Co., which operates the Anchor Line of steamers on the Great Lakes, and has docks, grain elevators, etc., at Erie, Buffalo and elsewhere. The P. RR. already owns a controlling interest. The offer is to pay for the shares in P. RR. stock at 130. This is in connection with the plan for an outlet to Buffalo.

See also Pennsylvania & Buffalo Connecting in Railroad Construction column.

**PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.**—In order to refund certain bonds bearing higher rates of interest, the company is issuing \$9,578,000 of its consolidated mortgage 3½ per cent. bonds, series E, dated Aug. 1, 1899. The bonds to be retired are as follows:

	Total issue.	Already cancelled.
First consolidated mortgage 7s. due Aug. 1, 1900	\$5,863,000	\$3,144,000
Consol. Mort. series B, 4½ per cent., maturing April 1, 1912	1,214,000	1,214,000
Consol. mortgage series C, 4½ per cent., maturing Nov. 1, 1912	621,000	621,000
Consol. mortgage series D, 4 per cent., maturing Nov. 1, 1915	880,000	880,000
Total	\$9,578,000	\$5,859,000

The New York Stock Exchange has listed \$5,859,000 Series E 3½ per cent. bonds.

**QUEBEC & LAKE ST. JOHN.**—A bill is before the Quebec Legislature to permit the company to issue bonds to an amount of £170,000 on the Quebec-Roberval section of the road. The proceeds are to be used in improving the roadbed and terminals of this division, rolling stock, and in paying certain debts. The company is also authorized to issue first mortgage bonds, ranking after the prior lien bonds, to the amount of £400,000, to redeem the £780,000 of first mortgage bonds, now out and in default, through non-payment of interest, due on July 1, 1899. The road also asks to be allowed to issue £500,000 income bonds, ranking after the first mortgage bonds, bearing interest at 6 per cent.

**RUTLAND.**—This company is reported to have bought the Unterville Counties Ry., which has a railroad from Iberville to Sorel, Que., 66 miles, but only operating from St. Johns Junction on the Canadian Pacific, north 61 miles to Sorel, from which point it has trackage rights over the Montreal & Atlantic from Sorel to Yamaska, 10 miles. It is stated that the Rutland will build an extension from Noyan Junction, which will be the terminus of the Rutland-Canadian, to a point on the Canadian Pacific so as to make a connection with Montreal.

**ST. JOSEPH, SOUTH BEND & SOUTHERN.**—This company, formerly the Indiana & Lake Michigan, has again changed hands, having been leased to the Indiana, Illinois & Iowa from March 1. The road is 40 miles long and was built as an extension of the Terre Haute & Logansport from South Bend to St. Joseph, Mich. After its completion it was leased to the Terre Haute & Indianapolis, which guaranteed its bonds, the T. H. & I. being also the lessee of the T. H. & L. at the time. The lessee defaulted on the interest on the bonds in September, 1896, when V. T. Malott was appointed receiver of the T. H. & I. and its leased lines. It was sold under foreclosure in December of 1898, and bought in by representatives of the bondholders who formed the St. J., S. B. & S.

**SEABOARD AIR LINE.**—The Greater Seaboard Air Line syndicate paid on Feb. 28 the \$300,000 due to the Produce Exchange Trust Co. of New York, on the Seaboard & Roanoke collateral which has been released. The next note is due April 22, and is on the Florida Central & Peninsula collateral.

An injunction was issued Feb. 27 by Judge Stockbridge in Baltimore, Md., against the consummation of the proposed Seaboard consolidation. The injunction was granted on the supplemental and amended bill of Daniel Crook. Judge Stockbridge ordered the resident defendants to show cause on or before March 12 why a permanent injunction should not be issued, and the non-resident defendants to show cause on or before April 14.

**SOUTHERN PACIFIC.**—This company on Feb. 23 paid to the United State Sub-Treasury at New York for the Central Pacific, \$2,940,635 to pay a note of the latter company which was not due until August, 1901.

The amount of Central Pacific first refunding mortgage 4 per cent. gold bonds listed upon the N. Y. Stock Exchange has been increased to \$54,659,500.

**STUTTGART & ARKANSAS RIVER.**—The property of this company was sold March 2, by C. C. Waters, Master in Chancery, to John M. Taylor, trustee, for \$50,000. The road is 40 miles long between Stuttgart, Ark., and Gillett. It was built 10 years ago and has been in the hands of a receiver since 1895.

**THIRD AVENUE (NEW YORK CITY).**—On Feb. 28 Justice Lacombe of the United States Circuit Court appointed Hugh J. Grant temporary Receiver on application of the Old Colony Trust Co. of Boston, holder of an overdue note for \$100,000. The liens are said to aggregate over \$6,000,000. To secure a reorganization of the company, the protective committee consisting of F. P. Olcott and Louis Fitzgerald, New York, and T. Jefferson Coolidge, Jr., Boston, invites the holders of the company's unfunded obligations, and the stockholders to deposit their securities with the Mercantile Trust Co., New York, or the Old Colony Trust Co., Boston. Messrs. Kuhn, Loeb & Co. will act as agents for the committee. The reorganization committee has bought the coupons due March 1, on the \$1,200,000 first mortgage bonds of the Forty-second Street, Manhattanville, & St. Nicholas Avenue RR. (controlled by the Third Avenue).

John Beaver, Treasurer of the Third Avenue Co., has succeeded A. J. Elias as President of the Forty-second Street, Manhattanville & St. Nicholas Avenue Co. Geo. W. Lynch succeeds Mr. Elias as President of the Dry Dock, East Broadway & Battery RR. Co.

**TOLEDO, ST. LOUIS & KANSAS CITY.**—Foreclosure sales of this road by Special Masters Frank H. Shaffer and Merrill Moores is advertised to take place at the freight station of the road in Toledo, O., March 27. The road will be sold in one parcel covering a distance of 450 miles, with all terminal securities owned, equipment and interest in other property embraced under the first mortgage. A certified check for \$25,000 is required from each bidder. The upset price is \$7,500,000, and upon the acceptance of any bid, \$75,000 must be paid down at once.

**VIRGINIA & TRUCKEE.**—It is reported that negotiations are pending for the sale of this road to the Southern Pacific Co. It extends from Reno to Virginia, Nev., 52 miles.